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SELECTIONS FROM THE RECORDS OF THE BOMBAY GOVERNMENT.

No. XXXIII.—New Series.

PAPERS RELATIVE TO A PROJECT

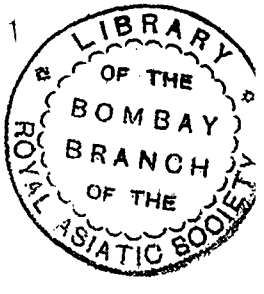
FOR

WET AND DRY DOCKS

IN THE

105553

HARBOUR OF BOMBAY.



Bombay:
PRINTED FOR GOVERNMENT
AT THE
BOMBAY EDUCATION SOCIETY'S PRESS.
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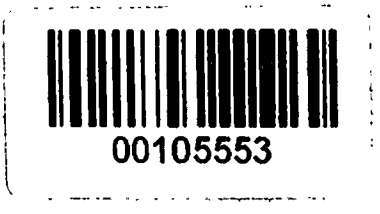


CONTENTS.

PAGE

Letter from the Chief Engineer, No. 789, dated 31st October 1854 1
Letter from Mr. Heycock, dated 15th March 1855 3
Government Resolution, dated 17th March 1855 4
Government Letters Nos. 94 and 95, dated 21st March 1855 .. .. .. 5, 6
Letter from the Chamber of Commerce, No. 28, dated 28th March 1855 .. 6
Government Resolution, dated 31st March, communicated with memorandum No. 165, dated 3rd April 1855 7
Letter from the President of the Dock Committee, No. 2, dated 25th April 1855. 7
Letter from ditto ditto, No. 3, dated 3rd May 1855. 8
Government Letter No. 327, dated 5th May 1855 9
Letter from the President of the Dock Committee, No. 4, dated 23rd August 1855 10
Government letter No. 1120, dated 31st August 1855 11
Ditto ditto No. 1152, dated 6th September 1855 11
Letter from the President of the Dock Committee, No. 8, dated 10th October 1855, with accompaniments 12
Minute by the Right Honorable the Governor, dated 19th October 1855 .. 39
Ditto by the Honorable Mr. Lumsden, dated 23rd October, with memorandum by Mr. Heycock 40
Ditto by the Honorable Mr. Malet, dated 24th October 44
Further Minute by the Right Honorable the Governor, dated 29th October .. 45
Ditto by the Honorable Mr. Lumsden, dated 5th November 46
Ditto by the Honorable Mr. Malet, dated 6th November 48
Government letter No. 1698, dated 13th November 1855 48
Letter from the President of the Dock Committee, No. 10, dated 13th November 1855 50
Government letter No. 1734, dated 17th November 1855 51
Ditto No. 1756, dated 22nd November 1855 51
Letter from the President of the Dock Committee, No. 11, dated 3rd December 1855, with accompaniments 52
Government letter No. 1699, dated 13th November 1855 56

PAGE

Letter from Commissioner of Customs, No. 1850, dated 13th December 1855, with accompaniment 56
Minute by the Honorable Mr. Lumsden, dated 20th December (with postscript). 62
Ditto by the Honorable Mr. Malet, dated 27th December 63
Ditto by the Right Honorable the Governor, dated 2nd January 1856 .. 64
Further Minute by the Honorable Mr. Lumsden, dated 13th January 66
Ditto by the Honorable Mr. Malet, dated 14th January 68
Ditto by the Right Honorable the Governor, dated 19th January .. 68
Government letter No. 278, dated 13th February 1856 68
Letter from the President of the Dock Committee, No. 2, dated 30th April 1856 69
Government letter No. 1273, dated 23rd May 1856 71
Letter from the President of the Dock Committee, No. 3, dated 11th June 1856 73
Government Resolution of 19th June 1856, communicated with memorandum No. 1559, of 21st idem, from Mr. Secretary Hart 74

LIST OF PLATES.

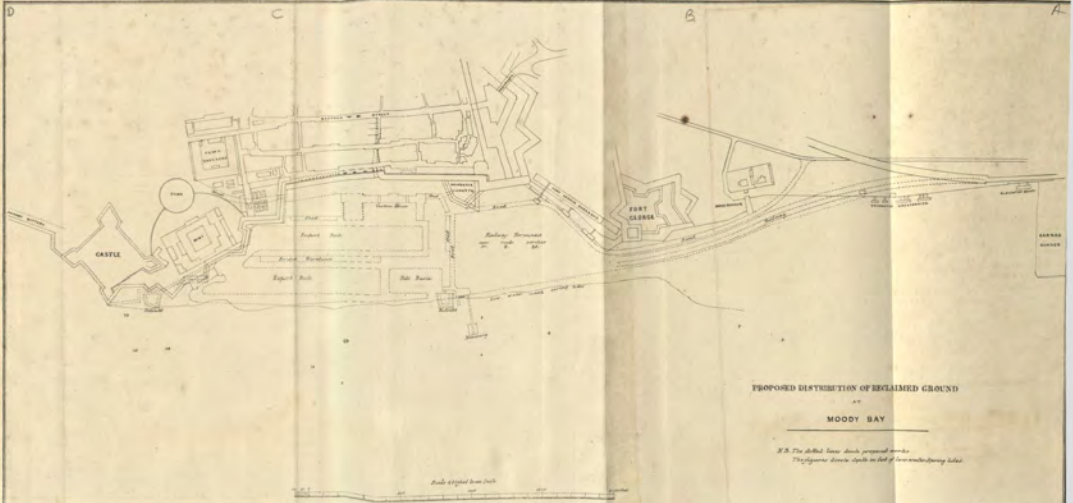
I. Proposed Distribution of Reclaimed Ground at Moody Bay.

II. Moody Bay Docks.

III. Plan of Ground between the Carnac and Arthur Bunders, with proposed Import and Export Docks at Moody Bay.

IV. Plan of Ground between the Carnac and Arthur Bunders, with proposed Import and Export Docks at the Colaba Channel.

V. Plan of Ground between the Carnac and Arthur Bunders, with proposed Import and Export Docks, and Railway Terminus, as approved by Government Resolution of 19th June 1856.

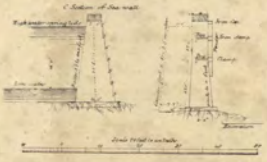

D
C
B
A
CASTLE
TOWN
BARRACKS
FORT CLARKE
Road
Railway
Embankment
Railway Entrance
Ferbert Dock
Victoria Warehouse
Edward Dock
Tide Basin
Railway Entrance
Road to Capital Town Castle
PROPOSED DISTRIBUTION OF RECLAIMED GROUND
MOODY BAY
N.B. The dotted lines denote proposed works
The figures denote depth in feet at low water spring tides

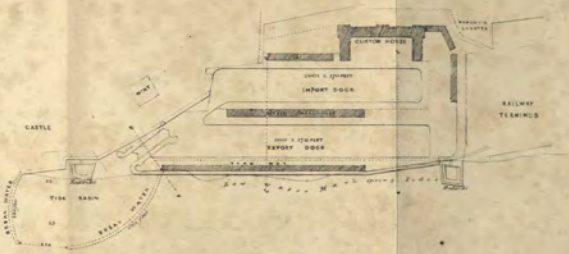
A

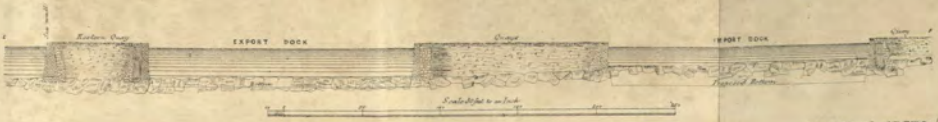
MOODY BAY DOCKS

B

C







Harold C. Gerrard C.E. P.W. Dept.
August 1910

Blueprint now robotically filed in the Office of the Chief Engineer of P.W. Bamboo 1910-1911

PLAN of GROUND
between the
CARNLOUGH & ARTHUR BUNDERS and proposed IMPORT and EXPORT DOCKS.
at
MOODY BAY.
The proposed new line of Piers, by lines drawn thus.....
Middle Ground Spit
Scale 200 feet to one Inch.
Signed Charles Waddington
Superintendent Engineer.

PLAN OF GROUND
between the
CARNAC and ARTHUR BUNDERS with proposed IMPORT and EXPORT DOCKS
at the
COLABA CHANNEL
The proposed works are shown by Green dotted lines
RAILWAY TERMINUS
CARRIAGE APPROACH LINE

PLAN OF GROUND
CARNAC and ARTHUR DUNDEE and proposed IMPORT and EXPORT DOCKS.
A
B
C
D
E
F
G
H
J
K

PROJECT FOR WET AND DRY DOCKS.

No. 789 of 1854.

Financial Department
(Railway Branch).

From Colonel C. Waddington, C.B.,
Chief Engineer,
To H. E. Goldsmid, Esq.,
Offg. Chief Secretary to Government.

Sir,—Referring to my letter No. 276, of the 21st April last, and to the resolution of Government thereupon, No. 2831, of the 10th June, I have now the honour to submit with this letter the plan which I propose for the distribution of the space to be recovered from the sea at Moody Bay.

2. The objects proposed in the recovery of that ground were to obtain an ample and convenient terminus for the railway, and room for a new custom-house, with bonded warehouses, tide-basins, and other useful accommodation. The establishment of wet docks for the reception of ships was not then contemplated.

3. Agreeably to the instructions of Government, having acquainted myself with the views of the Commissioner of Customs, and of the Superintending Engineer Railway Department, and having decided on the necessary modifications of the adjoining fortifications, and the defences which would be required in addition, for the protection of the new ground, I was enabled to give directions to Captain Tremenheere, according to which he matured a plan for the occupation of the ground. That officer had previously made the necessary preliminary surveys, and collected much information connected with the proposed works. He had also commenced detailed

plans for the custom-house and other buildings, in which I regret to say he was interrupted by sickness.

4. In the mean time, a project for the construction of wet docks by a Company of merchants was submitted to Government by Mr. Heycock, and I was informed that it was thought very desirable to combine this project with the arrangements for the custom-house at Boree Bunder. My own opinion as to the great advantages of wet docks (though not as to the agency to be employed in constructing them) quite coincided with the views thus communicated to me, but there was considerable difficulty in effecting a combination of the two projects,—viz. the enclosure of the space at Boree Bunder for custom-house purposes, and the formation of wet docks to the north of Boree Bunder.

5. Mr. Young, with whom I consulted, was of opinion that if wet docks were formed capable of receiving all the square-rigged vessels which frequent this port, it would be important to place the custom-house in their immediate vicinity. Now Mr. Heycock's scheme is to construct docks between Boree Bunder and the Carnac Bunder, and their nearest point to the new custom-house would have been half a mile distant.

6. My objections as Chief Engineer to removing the custom-house to Boree Bunder are, of course, insuperable so long as the present fortifications of Bombay shall be retained, and no building of durable construction could be permitted on the esplanade of Fort George, and so close to it. It seemed to me, moreover, most desirable that the custom-house should be embraced within the defences, and in a more central position as regarded the mercantile population of the Fort.

7. There were other objections to Mr. Heycock's plan of docks, which would occupy the whole shore from Boree Bunder to Carnac Bunder. The difficulty of finding any other available spot for a slaughter-house would be very great, and the Native regiments would be deprived of their necessary accommodation. The advantages of the spot selected by the merchants are, that the bottom, or portions of it, being moorum, are thought to be favourable for foundations, and that the position is not exposed. On the other hand there would be difficulty in obtaining sufficient depth of water for the approach of ships, to judge by the soundings.

8. In the latter particular, the site of Moody Bay would have the

advantage, as there is comparatively deep water near its southern extremity, but the excavation of docks to the requisite depth, and the laying of the foundations of quays, which must be water-tight, would entail, I fear, great expense and difficulty, the bottom being mud, with rock below.

9. However, there is little doubt that the work might be effected, and on a careful consideration of all the above-stated reasons for and against the formation of wet docks to the north of Boree Bunder, I have designed the accompanying plan, wherein two wet docks, one for imports the other for exports, are comprised in the enclosure at Moody Bay, each capable of accommodating alongside of the wharves from eleven to thirteen square-rigged vessels of moderate size. There is, moreover, a tide-basin for the reception of country craft.

10. The ground allotted for the railway (more than 10½ acres) has been admitted by the Superintendent to be sufficient for their requirements; but having, since my receipt of Major Crawford's assent, arranged to increase the width of their ground from east to west, I have proportionally, by a length of 40 feet, encroached on the south boundary, which I first proposed to assign to them. I do not expect that any inconvenience will arise from this change, or that any objection will be made to it.

I have the honour to be, &c.

(Signed) C. Waddington, Colonel,
Chief Engineer.

Bombay, Chief Engineer's Office, 31*st October* 1854.

(True copy)

(Signed) C. Waddington, Colonel,
Chief Engineer.

To W. Hart, Esq.,
Secretary to Government, General Department.

Bombay, 15*th March* 1855.

Sir,—I have to request that you will lay the following application before the Governor:—

That the Government will please to grant to a Dock Company,

when formed, such ground as the said Company may reclaim from the sea, for the purpose of forming wet and dry docks, extending along the shore from the Carnac Bunder to Fort George, with the privilege of making a bunder or quay along the shore for the use of the docks.

With this is a plan of the proposed wet docks. The plan for the dry docks is not yet prepared.

I am

Your most obedient Servant,

(Signed) EDWIN HEYCOCK.

Resolution of Government, dated 17th March 1855.

RESOLVED,—That Mr. Heycock's proposition of the 15th instant, and accompanying plans, be, with the Chief Engineer's letter No. 789, dated 31st October 1854, and its accompaniment, referred for the opinion and report of a Committee, who shall be requested to take into their consideration these plans, and any others which may be brought before them, with a view to determine the locality which it will be most proper for Government to offer to any Company who may undertake to construct the projected docks.

2. The considerations which, on a *primâ facie* view of this question, seem most to affect it, are the availability or otherwise of any place adapted in an engineering point of view for their construction; the convenience of merchants, the public, and Government, with respect to the proximity of such place to the custom-house; the extent to which the defences of the fort and harbour may be affected; and the extent to which they may affect the railway approach to Bombay.

3. As the several interests to be taken into consideration by the Committee are numerous, and as Government are desirous that they should, as far as possible, be represented, the Committee must necessarily be a large one. Government resolve that the Chamber of Commerce be invited to select two of their body willing to associate themselves with the following gentlemen, who shall be requested to form a Committee for the above purpose:—

Major General Waddington, Chief Engineer of Public Works.
E. Heycock, Esq.

Commander Daniell, Master Attendant and Inspector of the Port.
R. Strong, Esq.
R. Spooner, Esq., Acting Commissioner of Customs.
J. J. Berkley, Esq., and
Major Estridge, Executive Engineer, Belgaum (at present at Bombay), who will also act as Secretary to the Committee.

No. 94 of 1855.

Public Works Department.

To Major General C. Waddington,
Chief Engineer of Public Works.
E. Heycock, Esq.
Commander Daniell,
Master Attendant and Inspector of the Port.
R. Strong, Esq.
R. Spooner, Esq.,
Acting Commissioner of Customs.
J. J. Berkley, Esq.
Major Estridge,
Executive Engineer, Belgaum (at present at Bombay).

Gentlemen,—I am directed to forward to you a copy of the papers noted in the margin, regarding the construction of wet and dry docks in Bombay, and to convey to you the request of the Right Honorable the Governor in Council that you will be so good as to form yourselves into a Committee for the purpose stated in the Government resolution dated the 17th March 1855.

Letter from E. Heycock, Esq., dated 15th March 1855, with plan.
Letter from the Chief Engineer, No. 789, dated 31st October 1854, with plans.
Resolution of Government, dated 17th March 1855.

2. With reference to paragraph 3 of the resolution, I am desired to intimate that the Chamber of Commerce have been invited to select two of their body, in addition to Messrs. Strong and Heycock, who may be willing to associate themselves with you as members of the Committee now appointed.

I have the honour to be, &c.
(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 21st March 1855.

No. 95 of 1855.

To the Secretary to the Chamber of Commerce.

Major General C. Waddington, Chief Engineer of Public Works.
E. Heycock, Esq.
Commander Daniel, Master Attendant and Inspector of the Port.
R. Strong, Esq.
R. Spooner, Esq., Acting Commissioner of Customs.
J. J. Berkley, Esq.
Major Estridge, Executive Engineer, Belgaum (at present in Bombay).

Sir,—In transmitting to you the accompanying copy of a letter this day addressed to the gentlemen named in the margin, and of the documents therein referred to, I am directed to convey to the Chamber the request of the Right Honorable the Governor in Council that they will be so good as to select two of their body who may be willing to become members of the Committee appointed by Government.

I have the honour to be, &c.

(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 21*st March* 1855.

No. 28 of 1855.

To W. Hart, Esq.,
Secretary to Government, Bombay.

Sir,—I have the honour, by direction of the Committee of the Chamber of Commerce, to acknowledge receipt of your letter No. 95 of 1855, in the Public Works Department, dated the 21st instant, with papers attached, relating to a purpose of forming wet and dry docks in the harbour of Bombay.

In compliance with the request which the Right Honorable the Governor in Council has done them the honour to make, the Chamber beg leave to nominate Mr. John Parsons, of Messrs. Cardwell, Parsons, and Co., and Mr. John Ritchie, Agent for the P. and O. Company in Bombay, two of their members, to deliberate with a Committee, of which the other members have been named by Government, on any plans that may be laid before them, " with a view to determine the locality which it will be most proper for Government to

offer to any Company who may undertake to construct the projected docks."

I have the honour to be, &c.

(Signed) JOHN CONNON,
Secretary.

Bombay, Chamber of Commerce, 28th March 1855.

Resolution of Government, dated 31st March, on the foregoing Letter from the Secretary to the Chamber of Commerce.

The Chief Engineer to be informed of the Chamber's choice of these gentlemen, and requested to undertake the organisation of the Committee as its President.

[The above resolution was communicated to the Chief Engineer of Public Works under date 3rd April 1855, No. 165.]

No. 2 OF 1855.

PUBLIC WORKS DEPARTMENT.

To W. HART, Esq.,
Secretary to Government.

SIR,—I have the honour to request you to lay before the Right Honorable the Governor in Council the following extract of proceedings of the Committee appointed to consider the question of wet and dry docks, viz :—

"*Resolution of Committee.*— That the Committee agree with Mr. Berkley as to the want of precise information on the following points, as enumerated in his memorandum,—

"3. The facilities or difficulties which each site presents for the construction of the proposed docks.

"*Resolution of Committee.*—The acquisition of correct information on these points can only be made by a careful examination of the ground by probing or boring ; and as this will involve expense, Government should be addressed to sanction that expenditure, and authorise some qualified Engineer to conduct the required experiments."

"4. An approximate estimate of the cost of the proposed docks, and the period that would probably be requisite for constructing them.

"Mr. Heycock will furnish the Committee with an approximate estimate for the execution of his project. Government to be addressed, with a request that they will allow some qualified Engineer to prepare estimates for the docks at the other two sites."

2. Three sites have been suggested to the Committee as appropriate for docks, viz. Boree Bunder, or Mr. Heycock's site; Moody Bay, proposed by Major General Waddington; and the space between Bummelow Island, on Colaba, and the Apollo Pier, suggested by some members of the Committee; and it will be seen from the above that the Committee, previously to their being able to arrive at a satisfactory decision as to the best site for docks, require information which cannot be obtained without the assistance of a qualified Engineer. I have the *honour* to request, in the name of the Committee, that Government will be pleased, in accordance with their wishes, to appoint some qualified Engineer to make the required examination, and furnish a report on the nature of the several sites, and a rough estimate of the cost of building docks on each of them.

I have the honour to be, &c.

(Signed) C. WADDINGTON, Major General,
President of the Committee.

Bombay, 25*th April* 1855.

No. 3 OF 1855.

PUBLIC WORKS DEPARTMENT.

To W. HART, Esq.,
Secretary to Government.

SIR,—Referring to my letter to your address No. 2, of the 25th April, in which I had the honour to submit a request, from the Committee of which I am President, that Government would be pleased to appoint a qualified Engineer to examine and report on the several sites in Bombay Harbour proposed for wet docks, I beg to bring to the notice of the Right Honorable the Governor in Council that Lieutenant Selby, of the Indian Navy, has declared his readiness to

perform this service, if Government and the Commander in Chief of the Indian Navy should permit him to do so.

2. Lieutenant Selby has recently made soundings of the harbour of Bombay, and is an experienced nautical surveyor. He would undertake to prepare a plan on a large scale of that part of the harbour which comprises the three sites best fitted, apparently, for wet docks, giving the depths at different times of tide, both spring and neap, the nature of the bottom throughout, and at what depth beneath a rocky or otherwise firm stratum is to be found.

3. During this examination, Lieutenant Selby would probably have opportunities of observing the facilities or obstacles to approach of the several sites; and it seems to me not unlikely that a naval officer would execute this duty more satisfactorily, and, from the assistance which might be rendered to him from the Indian Navy, more economically, than a civil engineer.

4. The preparation of an estimate Lieutenant Selby could not undertake, but, with the data which he would furnish, it would no longer be difficult to draw up a rough estimate.

I have the honour to be, &c.

(Signed) C. WADDINGTON, Major General,
President of the Committee on a Site for Wet Docks.

Bombay, 3*rd May* 1855.

No. 327 OF 1855.

PUBLIC WORKS DEPARTMENT.

To the COMMANDER IN CHIEF OF THE INDIAN NAVY.

SIR,—The Committee recently appointed to consider the question of wet and dry docks have proposed three sites as appropriate for docks in the Bombay harbour, and it has been recommended to the Right Honorable the Governor in Council that Lieutenant Selby, of the Indian Navy, should be entrusted with the duty of examining and reporting upon them.

2. His Lordship in Council is desirous that advantage should be taken of the qualifications of Lieutenant Selby for this duty, and requests, therefore, that you will have the goodness, without loss of

time, to make his services available for the purpose indicated above; but this, I am directed to add, is not intended to interfere with Lieutenant Selby joining his new appointment in the Persian Gulf and on the Euphrates; and the requisite surveys are to be undertaken by him only on that understanding.

I have the honour to be, &c.
(Signed) W. HART,
Secretary to Government.

Bombay Castle, 5th May 1855.

No. 4 OF 1855.

PUBLIC WORKS DEPARTMENT.

From Major General C. WADDINGTON, C.B.,
Chief Engineer,
To W. HART, Esq.,
Secretary to Government.

SIR,—Referring to your letter No. 94, of the 21st March last, constituting a Committee for the purpose of determining the locality best adapted for wet docks, I have the honour to bring to the notice of the Right Honorable the Governor in Council that the following members of the Committee have left Bombay, and will not be again available as members :—

Commander Daniell, Master Attendant.
Major Estridge.
John Ritchie, Esq., nominated by the Chamber of Commerce.

I request that you will obtain the orders of Government as to the appointment of fresh members to replace these three gentlemen.

I have the honour to be, &c.
(Signed) C. WADDINGTON, Major General,
Chief Engineer, and President of the Committee
for reporting on the question of Wet Docks.

Bombay, Chief Engineer's Office, 23rd August 1855.

No. 1120 of 1855.

Public Works Department.

To Major General C. Waddington,
President of the Committee appointed to consider
the Project for Wet and Dry Docks.

Sir,—In reply to your letter No. 4, dated the 23rd August, I am directed to acquaint you that the Chamber of Commerce have been invited to name another gentleman, in place of Mr. Ritchie, to act as a member of the Committee.

2. A reference has also been made to the Commander in Chief of the Indian Navy, to ascertain if he has any objections to the appointment of the Master Attendant as a member *ex-officio*, in succession to Captain Daniell.

3. The Right Honorable the Governor in Council does not consider it necessary to fill Major Estridge's place in the Committee.

I have the honour to be, &c.

(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 31*st August* 1855.

No. 1152 of 1855.

Public Works Department.

To Major General C. Waddington,
President of the Committee appointed to consider
the Project for Wet and Dry Docks.

Sir,—With reference to my letter No. 1120, dated the 31st August 1855, I am directed to acquaint you that, at the recommendation of the Chamber of Commerce, the Right Honorable the Governor in Council has been pleased to appoint Mr. James Graham to act as a member of the Dock Committee, in the place of Mr. Ritchie.

2. With the concurrence of the Commander in Chief of the Indian

Navy, His Lordship in Council has also appointed the Master Attendant a member *ex-officio* of the Committee.

I have the honour to be, &c.

(Signed) W. HART,
Secretary to Government.

Bombay Castle, 6th September 1855.

No. 8 OF 1855.

PUBLIC WORKS DEPARTMENT.

To W. HART, Esq.,
Secretary to Government.

SIR,—I have the honour with this letter to submit the final resolution of the Committee appointed by the Right Honorable the Governor in Council to consider certain projects and plans for wet and dry docks, laid before them with your letter No. 94, of the 21st March 1855, and also any others which might be brought before them, with a view to determine the locality which it will be most proper for Government to offer to any Company who may undertake to construct the projected docks.

2. The final resolution of the Committee has appended to it copies of the proceedings of the Committee, with original papers which were brought before it in the course of its sittings, and the following plans and estimates accompany :—

Survey of part of Bombay Harbour, examined principally with a view to ascertain the best site for Wet Docks ; by Commander W. B. Selby, Indian Navy (a tracing).

Plan of proposed Docks between Carnac Bunder and Fort George, with an Estimate, amounting to Rs. 11,01,149 ; by C. Gerrard, Esq., Civil Engineer.

Plan of proposed Docks at Moody Bay, with an Estimate, amounting to Rs. 7,86,615 ; by C. Gerrard, Esq., Civil Engineer.

Plan of proposed Docks between the Apollo Pier and Arthur Bunder, with an Estimate, amounting to Rs. 9,68,079 ; by C. Gerrard, Esq., Civil Engineer.

Plan of proposed Docks to the south of Arthur Bunder, with an Estimate, amounting to Rs. 8,80,954; by C. Gerrard, Esq., Civil Engineer.

Four Sheets of Sections to the four abovementioned Plans; by C. Gerrard, Esq., Civil Engineer.

3. In addition to the cost of the docks, at whatever site they might be constructed, I may add, in my capacity of Chief Engineer, that as I should consider it necessary to recommend some protection, most probably towers or redoubts, in advance of and flanking the walls of the docks, a certain sum should be added to the estimate on that account. For the Moody Bay docks, as originally planned under my instructions, Major Tremenheere provided two redoubts, the estimated cost of which was Rs. 2,02,212. The site between the Apollo and Arthur Bunders would require at least the same amount of defence, and probably more.

4. The construction of lofty and substantial warehouses within a few hundred yards of the fortified *enceinte* would prejudice the defence of the Fort of Bombay to a certain extent without doubt, as an enemy in possession of such warehouses would have a musketry command over the opposite works; but this would not invalidate their use as a protection against assault or a *coup de main;* and, under the existing condition of the Fort, completely filled as it is with lofty and combustible buildings, the true use and value of the walls I consider to be this, that they are a protection against sudden assault, and not that they would support a siege, or a continued bombardment from an armament of any considerable force. In time of peace, also, they keep out robbers, and give a great feeling of security to the inhabitants of the Fort, as is well known to those who have spoken with intelligent Natives on the subject.

5. When, from necessity or strong motives of convenience, lofty buildings, or even temporary obstructions, such as vessels on the slips, must be tolerated within a moderate distance of the ramparts, the wisest course is to endeavour to protect them from the near approach of an enemy by heavy batteries and redoubts. To enclose them within continued walls, and thus add them to the fortifications, would be attended with great inconvenience, and is not, therefore, to be recommended; but to leave them without defence, exposed, perhaps, to destruction by a single hostile frigate, is equally to be deprecated, in my humble opinion. In any system of docks, there-

fore, the cost of two or three redoubts should be reckoned in addition to the estimate for the docks.

I have the honour to be, &c.

(Signed) C. WADDINGTON, Major Genl., Engineers,
President of the Dock Committee.

Bombay, 10*th October* 1855.

Final Resolution of the Committee appointed by Government to consider and report upon certain Projects and Plans for Wet and Dry Docks, with a view to determine the Locality which it will be most proper for Government to offer to any Company who may undertake to construct the projected Docks.

1. With regard to the site proposed by Mr. Heycock between the Carnac Bunder and Boree Bunder,—

RESOLVED,—That any advantages which the site proposed by Mr. Heycock presents are overbalanced by the probable difficulties and expense of construction on that site.

2. That the site at Moody Bay is not sufficiently large for a general scheme of dock accommodation, although it might suffice for import docks only. From the estimates before the Committee, it appears, also, that the cost of construction at Moody Bay would be much more considerable, in proportion to the accommodation afforded, than at any of the other sites. The site is in all other respects most eligible.

3. That the site between Apollo Bunder and Arthur Bunder appears to the Committee, all points considered, preferable to any other. It has the paramount advantage of ample space, is easy of access by sea, possesses commercial conveniences little inferior to those of the Moody Bay site, and, with reference to the accommodation to be obtained, may probably be built on at a lower cost.

4. That the site proposed between Arthur Bunder and Bummalow Island has no particular advantages either for construction or

approach, and is too far from the Town and Fort to be recommended.

(Signed) C. WADDINGTON, Major General, Engineers, President.
„ E. HEYCOCK.
„ CHARLES WILLIAM MONTRIOU, Commander I. N., and Master Attendant.
„ R. STRONG.
„ RICHARD SPOONER.
„ JOHN PARSONS.
„ JAMES GRAHAM.

APPENDIX.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 18*th April* 1855.

Present,—
Major General C. WADDINGTON, C.B.
E. HEYCOCK, Esq.
Commander DANIELL, I. N.
R. STRONG, Esq.
R. SPOONER, Esq.
J. PARSONS, Esq.
J. RITCHIE, Esq.
Major ESTRIDGE.

Absent,—
J. J. BERKLEY, Esq.

Read letter from Government, No. 94, dated 21st ultimo, appointing the Committee, also the following accompaniments to the above:—

Letter from Mr. Heycock, dated 15th ultimo, to Secretary to Government.

Letter No. 789, dated 31st October 1854, from Colonel Waddington, C.B., to Secretary to Government.

Resolution of Government, dated 17th March 1855.

The following statement by Mr. Heycock, setting forth the advantages of a dock at Boree Bunder, read to the Committee :—

1. That it is central between the Fort and Town of Bombay.
2. That the railway runs alongside the dock, and, without inconvenience, could deliver all goods ready for export, and receive goods ready for the interior, at once, to and from the ships.
3. That it provides space for all the shipping now trading with Bombay, and for a largely increased trade for some time to come.
4. That, taking the extent of the docks into consideration, the cost of constructing them is less for their accommodation than any other place yet selected.
5. That the position is well sheltered for shipping, and the difficulties for entrance not so great as to render the cutting of the necessary channel anything like an impracticable difficulty.

The following statement, made in support of Colaba as a site for the docks, is brought before the Committee by a member, and read:—

1. That the docks would be brought to the chief seat of present seaborne trade, more particularly that with Europe, and which docks are more particularly designed to benefit.
2. That it is the chief, if not the only depôt of the cotton trade, and offers great facilities for the landing and storage of such.
3. That the warehouse accommodation for European manufactures is already great, and, from the vacant space existing, affords opportunity of extending the same if required.
4. That the large Press Companies have their chief establishments there, and where the bulk of the cotton and wool is now pressed.
5. That it is not inconvenient as regards the offices of the mercantile community, the European portion of the Fort and that part of Colaba being now in close contact.
6. The Custom House returns will show that the general trade at Colaba has of late years considerably increased, and which of itself may be taken as evidence of the advantages the locality offers in a commercial point of view for the formation of docks.

The following objections to the several plans presented themselves in discussion by the Committee.

To Mr. Heycock's plan:

One effect of adopting Mr. Heycock's plan would be to transfer the seaborne trade of Bombay from the Fort and Colaba to the Native Town in a great measure.

Difficulty of access for ships.

Reply:

Mr. Heycock thinks otherwise, as his proposed docks are nearly central between the Fort and Native Town. The warehouse accommodation is already as extensive as can ever be in the Fort, and any increase thereof must extend itself in a northerly direction, on account of the railway.

Objections raised to the Moody Bay Docks:

1. There is not sufficient room adjoining the docks for the general trade of the place, which would of course seek to approach the docks, and specially for stowing cotton and wool. There are cotton-screws in the Fort, not very far removed, but not sufficient for the whole trade.

2. That the docks provided are not sufficient to accommodate the shipping of the port, either as to number or size of the ships.

3. There is no provision for dry docks.

Reply:

Major General Waddington replies that they suffice for the present shipping as to number, though not, perhaps, as to size; and that they may be enlarged, though only at a heavy expense. It is considered that the improved expedition in the discharge and despatch of vessels will decrease the number of vessels at any one time in harbour considerably.

Mr. Ritchie, Captain Daniell, and Major General Waddington doubt whether it would be desirable, as a speculation, to build a dry dock in addition to the wet docks.

Objections to the site between the Apollo Pier and Colaba (Bummalow Island):

1. Inconvenience of its position with reference to the railway terminus, as at present proposed.

2. The exposed situation and rough sea during the monsoon.

Reply:

Might be remedied by a breakwater, but there would probably be an accumulation of silt.

Resolutions of Committee :—

1. The Committee are, with the exception of Mr. Heycock, unanimous in disapproving of the site proposed by him for docks.

2. With regard to the plan for docks at Moody Bay, the Committee are unanimously of opinion that, if sufficient accommodation could in any way be obtained at that site, it offers greater advantages than either the site proposed by Mr. Heycock, or that suggested between the Apollo Bunder and Bummalow Island.

3. The suggestion for making docks between Apollo Bunder and Bummalow Island deserves attention, from the great commercial interests which it would serve; and the Committee think that if any Company should be formed with a view of carrying such a project into execution, and should decidedly prefer it to the site at Moody Bay, it may be worthy the consideration of Government whether, under such circumstances, it might not be proper to sanction such an undertaking in preference to that at Moody Bay, or in concurrence with it.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 24th April 1855.

Present,—

Major General WADDINGTON, C.B.
E. HEYCOCK, Esq.
R. STRONG, Esq.
R. SPOONER, Esq.
J. J. BERKLEY, Esq.
J. PARSONS, Esq.
J. RITCHIE, Esq.
Major ESTRIDGE.

Absent,—

Commander DANIELL, I. N.

The President laid before the Committee a plan of the eastern

shore of Bombay, from the Carnac Bunder, north of the Esplanade, to the Jamsetjee Bunder at Colaba, showing the low-water line at spring tides, and the soundings.

The following memorandum was added to the objections recorded in the proceedings of the previous meeting, viz :—

Mr. Ritchie carries his objections much further. He is of opinion that the advantage of bringing ships into a wet dock has been much overrated; that the discharge and loading of ships in the harbour of Bombay can be performed with facility and despatch; and that he should deprecate any compulsory use of wet docks attended with heavy dock dues.

A memorandum from J. J. Berkley, Esq., dated 20th April, is laid before the Committee (A).

The proceedings of the former meeting of the Committee having been read over, with the addition of Mr. Ritchie's objections to the advantage of bringing ships into wet docks at all, and discussed, as well as Mr. Berkley's memorandum of the 20th instant, the Committee adopt the following resolutions :—

That the Committee agree with Mr. Berkley as to the want of precise information on the following points, as enumerated in his memorandum :—

"1. The area that would be available on each spot for wet and dry docks."

This information has been partially supplied by the plan laid before the meeting by the President.

"2. The navigable merits of the approach to each of the dock sites, with respect to the depth of water and width of the channel at low-water tides, to the currents, and prevailing winds."

Captain Daniell to be requested to favour the Committee in writing with information on these points.

"3. The facilities or difficulties which each site presents for the construction of the proposed docks."

The acquisition of correct information on these points can only be made by a careful examination of the ground by probing or boring; and, as this will involve expense, Government should be addressed to sanction that expenditure, and authorise some qualified Engineer to conduct the required experiments.

"4. An approximate estimate of the cost of the proposed docks, and the period that would probably be required for constructing them."

Mr. Heycock will furnish the Committee with an approximate estimate for the execution of his project. Government to be addressed, with a request that they will allow some qualified Engineer to prepare the estimates for the docks at the other two sites.

Amendment proposed by Mr. Berkley to the resolutions on the 3rd and 4th points,—

"That instead of requesting Government to sanction that expense, and authorise some qualified Engineer to conduct the required experiments, the promoters of the projects be requested to furnish the necessary information concerning their respective sites, either by witnesses or by documentary evidence."

The amendment, being put to the vote, was negatived, and the resolutions as proposed by the President affirmed.

N. B.—A letter was addressed to Government in accordance with the above, by the President of the Committee, dated 25th April 1855, and a subsequent letter on the 3rd May; and, in compliance with the Committee's application, Commander Selby, of the Indian Navy, was appointed to survey the sites proposed for the new docks. Mr. Gerrard, Civil Engineer, arriving shortly afterwards from England, was detained in Bombay on the recommendation of the Chief Engineer of Public Works, in order to prepare plans and estimates for docks on the several proposed sites.

A memorandum by Captain Daniell, dated 27th April, furnished by him in compliance with the request of the Committee, was circulated among the members, and is annexed (B).

Commander Daniell, Mr. Ritchie, and Major Estridge, having quitted Bombay, Captain Montriou and Mr. Graham were named members in place of the two former. Major Estridge, who had been Secretary to the Committee, was not replaced.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 13*th September* 1855.

Present,—

Major General C. WADDINGTON, C.B.
E. HEYCOCK, Esq.
R. STRONG, Esq.
R. SPOONER, Esq.
J. J. BERKLEY, Esq.
J. PARSONS, Esq.

Absent,—

Commander MONTRIOU.
J. GRAHAM, Esq.

The President produced before the Committee four plans for wet docks,—viz. one between Carnac and Boree Bunders, one at Moody Bay, one between the Apollo and Arthur Bunders, and one between the Arthur and Cotton-screw Bunder, Colaba, with estimates, amounting respectively to Rs. 11,01,149, Rs. 7,86,615, Rs. 9,68,079, and Rs. 8,80,954, the whole of the above having been prepared by C. Gerrard, Esq., Civil Engineer.

The President explained to the Committee that the plan of soundings prepared by Captain Selby had been sent in by that officer to the Commander in Chief Indian Navy, and that he, the President, had applied for the loan of the plan on the 10th instant, but had not received a reply to his application. As this plan is considered important towards forming a decision as to the preferable site for docks, it is decided to adjourn the Committee.

Committee adjourned.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 21st September 1855.

Present,—

Major General C. WADDINGTON, C.B.
E. HEYCOCK, Esq.
Commander C. W. MONTRIOU, I. N.
R. STRONG, Esq.
R. SPOONER, Esq.
J. PARSONS, Esq.
J. GRAHAM, Esq.

Absent,—

J. J. BERKLEY, Esq.

Captain Selby's chart, which had been received from the Commander in Chief Indian Navy, was laid before the Committee.

Read to the Committee a Memorandum (C) by Major Cruickshank on Mr. Gerrard's estimate for wet docks at Moody Bay, pointing out the deficiencies and mistakes in that paper, and increasing the estimate from Rs. 7,86,615 to Rs. 12,71,504 ; also a note from Major Cruickshank, stating his belief that the sea dam proposed by Mr. Gerrard would not stand out one monsoon.

As the defects and mistakes in all Mr. Gerrard's estimates are similar, it appears to the Committee that if the remaining estimates be increased in the same proportion as that for the Moody Bay docks, they will present a fair approximation to probable cost. According to that calculation, the estimates for the several projects would be as follows :—

	Mr. Gerrard's Estimate.	Corrected Estimate.
Docks between the Carnac and Boree Bunders (Mr. Heycock's site)..... Rs.	11,01,149	17,79,925
Docks at Moody Bay	7,86,615	12,71,504
Docks between Apollo & Arthur Bunders.	9,68,079	15,64,826
Docks south of Arthur Bunder	8,80,954	14,23,996

The two new members of the Committee being present for the first time, all the proceedings of the Committee were read over from the beginning.

Mr. Heycock expressing a wish to have the plans and estimates of the docks for more particular examination, Mr. Berkley having expressed the same wish at the last meeting, and the Committee being of opinion that, in addition to Captain Selby's chart, they should have the Master Attendant's matured opinion as to the comparative facility of ingress to the several proposed sites and egress from them, Commander Montriou was requested to furnish that information, and the Committee adjourns.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 5th October 1855.

Present,—

Major General C. WADDINGTON, C.B.
E. HEYCOCK, Esq.
Commander C. W. MONTRIOU, I. N.
R. STRONG, Esq.
R. SPOONER, Esq.
J. J. BERKLEY, Esq.
J. PARSONS, Esq.
J. GRAHAM, Esq.

The accompanying memorandum (D) of this date, drawn up by Commander Montriou, the Master Attendant, was laid before the Committee, also a memorandum (E) taken from the estimates of the areas of the docks, the number of ships which they would accommodate, and the amount of excavation in rock.

Mr. Berkley thinks that the Committee should, in their report to Government, avoid going into a statement or consideration of the arrangements proposed for the docks on the several sites, of the engineering details of construction, and of matters of estimate; but that the Committee should confine its opinion and observations to those general points upon which the eligibility of the several sites proposed for the Bombay docks depends.

Mr. Heycock lays before the Committee a memorandum (F) in which he withdraws his former opinion in favour of the site between the Carnac and Boree Bunders. The memorandum is read to the Committee.

The President inquires whether the report now made to Government shall comprise either the former proceedings of the Committee *in extenso*, or an abstract of the proceedings of the Committee, or be restricted to their final decision on the points submitted by Government.

The Committee decide that the proceedings shall accompany the report in the shape of an appendix.

The final resolution of the Committee is as follows. [See the preceding final resolution.]

(True copy)

(Signed) C. WADDINGTON, Major Genl. Engineers,
and President.

(A) *Memorandum.*

Having read the minute of proceedings of the Committee at the meeting of the 18th instant, it appears to me that there is not sufficient evidence before us to enable us to arrive summarily at final decisions upon the important projects that have been brought under our consideration. I think it indispensable, for the purpose of forming a correct judgment upon the comparative merits of the three sites which have been proposed for the Bombay docks, that we should have, among others, the following facts before us :—

The area that would be available at *each spot*, both for wet and dry docks.

The navigable merits of the approach to *each* of the dock sites, with respect to the depth of water and width of the channel at low tides, to the currents, and to prevailing winds.

The facilities or difficulties which *each* site presents for the construction of the proposed docks.

An approximate estimate of their cost, and the period that would probably be requisite for constructing them.

The capabilities as to available space, or the purchase of existing property, which the ground adjacent to the dock quays presents in each case for the accommodation of the export and import trade, for dock and customs offices, and both for ordinary road communications and complete railway station arrangements.

These, and other facts concerning each of the proposed sites, ought to be ascertained and placed before us, and considered with reference not only to the present, but to the prospective requirements of the commerce of the port of Bombay, before we can arrive at such conclusions as we should be able to abide by. In the absence of them, I am unprepared to record my decision upon the comparative merits of the three proposed sites for Bombay docks; but I beg to submit the following observations upon the three resolutions which are recorded in the proceedings at the late meeting:—

1*st*.—The central position of Mr. Heycock's docks between the port and town of Bombay is, I consider, highly eligible, so far as regards the accommodation of the public trade. It would be conveniently accessible for that part of it which is locally represented by the Fort on the one side and by the Native Town on the other; for the export and import trade of the interior of the country, as represented by the railway; and for the commerce of Colaba, as represented by the cotton-screws, warehouses, and offices of the Colaba Company, with which a convenient railway communication could be established with the greatest ease, and at small cost,—a fact which I have already ascertained, by having laid out a branch line from the Great Indian Peninsula Railway Company's main line at Boree Bunder to the Colaba Company's premises.

2*nd*.—Mr. Heycock's site for the docks possesses very great advantages as regards quay and warehouse accommodation, railway station arrangements, and public road approaches; in consequence not only of the available space between the new quay lines from Boree Bunder to the Native Town, and the southern boundary line of the temporary railway terminus, but also from the facilities that are presented by the shoal for reclaiming extended space for dock quay purposes beyond the quay wall which has been lately built. This advantage is of paramount importance, because the commerce with the interior consists of very bulky staples, which require spacious room for their accommodation, and will, in all probability, rapidly undergo a very large increase in quantity.

3*rd*.—Judging of Mr. Heycock's statement merely from his plan and chart, it appears that the site he proposes would afford ample dock room for all the shipping now trading with Bombay, and for a large prospective increase of it.

4*th*.—We are not in possession of sufficient evidence to allow of

our recording any opinion as to either the absolute or relative cost of constructing Mr. Heycock's docks.

5th.—Respecting the navigable and harbouring merits of Mr. Heycock's proposed site, it would appear to be well sheltered for shipping, while Lieutenant Selby's chart represents the difficulty of the entrance channel from the middle-ground of the harbour to be much less than might have been expected.

In addition to the above remarks, this site would admit of the construction of a dry dock; and I am prepared to express my impression that the construction of docks in the site proposed by Mr. Heycock would be favourably regarded by the Railway Company.

For these reasons, I beg to dissent from the first resolution of the Committee.

With reference to the Moody Bay site for the docks, it is admitted that although it would suffice for the present shipping of the port of Bombay as to number, it probably would not do so as to size, and that to increase it so as to meet fully the present and prospective wants of commerce would involve a heavy expense. I am not disposed to attach any weight to the supposition that greater expedition in the discharge and despatch of vessels would so far lessen their number as to reduce the requisite dock room to what is barely sufficient for the present trade; because I consider that the effect of expedition in that respect will be more than counterbalanced by the increase of shipping that will be consequent upon the construction of docks, the supply of materials for railways and public works, and upon opening out improved communications with the interior of the country. It appears, also, to be granted, that if a dry dock were needed it could not be made in Moody Bay.

This site, as regards the accommodation of trade, appears to me to be highly unfavourable. Although closely contiguous to the Fort, it is remote from the Native Town, and would not allow of a convenient railway communication with Colaba.

The space available for a quay for custom-house and dock offices, for warehouses, sheds and yards for railway station arrangements, and for public road approaches, is very inadequate, and could only be extended at enormous cost; because the adjacent ground in the Fort is now so greatly demanded for the present business, trade, and Government establishments within its limits, as to bear an immense marketable value; and, in addition to that, it would be necessary, for

the purpose of obtaining sufficient space, to destroy a great deal of valuable and important property.

I consider it indispensable that in selecting a site for docks due regard should be had to the practicability of providing ample railway station accommodation for the trade, and upon this essential part of the dock arrangements, which so greatly involves both the efficiency of the docks and public accommodation, I think that the proposed site at Moody Bay is open to most serious objections; while, as regards the interests of the Railway Company, I may confidently state that if the docks were constructed in Moody Bay, and their terminus were not allowed to be placed upon the plot of the reclaimed ground there, which the Government have virtually promised to concede to them, it would deteriorate their property, and otherwise be in the highest degree prejudicial to them.

With reference to the merits of the Moody Bay site as to facilities for the construction of docks, their approximate cost, and the period which would probably be required for completing them, no evidence is at present before me.

I beg, for the above reasons, to dissent from the second resolution of the Committee.

With respect to the statement made in support of Colaba as a site for the docks, I would submit the following remarks:—

1*st.*—Important vested interests undoubtedly exist in the neighbourhood of the proposed site, but it is most probable that the opening out of improved communications with the producing districts of the country will, in the course of a very few years, affect materially the present commercial arrangements; and although under any circumstances the commercial facilities and interests which exist at Colaba ought to be duly regarded, yet their importance becomes greatly lessened when we are considering the position of docks, which are to affect all the prospective sea-borne trade of the port of Bombay.

2*nd.*—Although Colaba is now the chief depôt of the cotton trade, I cannot for the above reasons regard that fact as of essential importance in the consideration of the question before us; but it must be admitted that the adjacent ground offers greater facilities for the landing and stowage of goods than either the Boree Bunder or Moody Bay sites. These, however, might still be made available, though the docks were placed at Boree Bunder, as proposed by Mr. Heycock, because a convenient branch railway between them and the

docks could be made with ease. This would only be practicable at great cost, and in an objectionable manner, if the docks were placed at Moody Bay.

3*rd.*—The advantages as regards warehouse accommodation for European manufactures could also be turned to account by means of the branch railway which I have alluded to.

4*th.*—The cotton-screws are at present the chief means of collecting so much of the trade of Bombay in the neighbourhood of Colaba; but having well deliberated upon the question of improved communication from Berar to Bombay, I am very strongly of opinion that this arrangement will be disturbed before the Bombay docks are completed, by the erection of cotton-screws at some centralised depôt in the interior of the country.

5*th.*—The Colaba site is not so convenient, either for the trade of the Fort or the Native Town, as Moody Bay, and very much less so than the Boree Bunder site.

6*th.*—Any increase in the general trade at Colaba that may be shown by the custom-house returns of late years is, no doubt, due to the existing facilities there. These appear to me to be of limited importance in considering the position of docks, which ought to be established for the accommodation of the entire prospective trade of the port of Bombay.

We have no evidence as to the facilities for constructing docks at Colaba, their probable cost, and time required for completion.

(Signed) J. J. Berkley.

Bombay, Railway Office, 20th April 1855.

(B) *Memorandum.*

As regards the navigable merits of the approach to each of the dock sites, I beg to state that the one proposed by Mr. Heycock is surrounded to the northward and eastward with dangerous reefs of rocks, and shallow water extends a long way off shore; to the southward, or near the Carnac Bunder, a small and narrow channel exists, but it is difficult of access, particularly during the south-west monsoon, on account of the shallowness of the water, and a heavy

southerly swell, which invariably breaks a long distance off shore. Several detached reefs of rocks are also in the vicinity of it, which would render it unsafe for deeply laden merchant ships to approach, unless under the most favourable circumstances.

The Moody Bay site, or the one proposed by General Waddington, I consider free from danger, there being no reefs in its immediate vicinity, and ample room to haul a ship not drawing more than 15 to 17 feet in or out at any time at high-water.

The Colaba site, from the Apollo Bunder to Bummalow Island, is very exposed and dangerous, particularly at the setting in and during the south-west monsoon, for the sea runs high, and breaks heavily a long distance off shore; several reefs and sunken rocks also surround the face of it, making it impracticable for any ship to approach with any degree of safety.

The tides run NNE. and SSW., at a general rate of one and half to two and a half miles per hour, and the average height of water at or near each of the above sites at the full and change of moon is from 20 to 22 feet, at the neaps from 14 to 16 feet. They are not always to be depended on, for during the north-east monsoon or fine weather season, particularly in the months of December and January, a very considerable difference in the rise is often experienced, which is much less these months than at other times.

Prevailing winds are as follows :—

From November to February land and sea-breezes are experienced; March and April westerly, NW.; May, southerly and SSE.; June to August, southerly and SW.; September and October westerly, with light land wind occasionally; and strong southerly SE. gales are often experienced in the latter end of October, and the early part of November.

(Signed) E. DANIELL, Commander I. N.,
Master Attendant.

Master Attendant's Office, April 29th, 1855.

(C) *Memorandum on Mr.* GERRARD'S *Estimate for Wet Docks at Moody Bay.*

There is no plan nor section of the sea dam given, but it is evident that rubble stone would not stand the wash of the sea with a medium width of 10 feet for a height of 28 feet. I would not undertake for a less slope than $1\frac{1}{2}$ to 1 in height outside, and 1 to 1 inside; this, with 2 feet of packed rubble on each side of the clay packing, would give 2,013,160 cubic feet of rubble stone, which, at Rs. 4 per 116 solid feet, for which I dare say the stone could be laid and filled in, would give, omitting fractions of a rupee.....Rs.	69,419	0	0
The second item in the abstract is charged too low. The mud cannot, I conceive, be brought in boats, carried to where it may be required, and stamped down, for less than Rs. 1-8-0 per 100 cubic feet, which for 5,12,400 cubic feet would give ..	7,686	0	0
In the description, the length of the import dock is put down as 1,070 feet long, which does not agree with the length per scale in the plan, and in the measurements it is entered as 1,057. It is impossible to say from these documents whether the depths to be excavated are correct; the calculations are right, cubic feet 2,271,540. The export dock is described as 1,340 feet long, while the measurements give 1,416, which is more than the length of the dock as shown in the plan. The third item in export dock is carried out 221,697 instead of 221,000, probably owing to some decimal being omitted after the height 13; this alteration will give a total of excavation for the export dock 2,268,230 instead of 2,268,927. The item for excavating between import and export gate is carried out 305,964 instead of 306,000, probably			
Carried over..Rs.	77,105	0	0

Brought over..Rs.	77,105	0	0
owing to the omission of some decimal. The dimensions for the lock chamber, &c. cannot be verified. The total excavation will therefore be 2,271,540 + 2,268,927 + 966,000 = 5,506,467 cubic feet. It is not stated what the excavation is likely to consist of, although the section shows that it is altogether stone. I do not think it could be done for a pie less than Rs. 4 per 100 cubic feet, which for the whole would give	2,20,258	0	0
The dimensions of the portion of the cremaillere work proposed to be removed in the plan and estimate are irreconcilable. The quantity is 406,400 cubic feet, and the rate, Rs. 3-4-0, seems sufficient	13,208	0	0
The sea wall foundation, 73,584, is correct, and as there is mud along the line, the rate, Rs. 3-4-0, may suffice. This wall extends from the redoubt to the beginning of the curve at the outer end of the lock	2,391	0	0
The total amount of the four items for filling in, in Mr. Gerrard's estimate, is 8,120,008 cubic feet, charged at 8 and 12 annas per 100 cubic feet; but it does not seem very clear on what principle this is done. Now, as there are 1,212,203 cubic feet of rubble stone masonry to be executed, I take it for granted that this quantity of stone will be procurable from the excavation of 5,506,467 cubic feet; there will, therefore, remain, for the purpose of filling in, 4,294,264 cubic feet earth and stone. I imagine that this cannot be moved, when it will be wanted, for less than 12 annas per 100 cubic feet; that rate will give for this portion of the filling in.....	32,207	0	0
There will, however, remain 3,825,744 cubic feet of filling in to be procured elsewhere, and as this must be brought from a distance, and be dis-			
Carried over..Rs.	3,45,169	0	0

Brought over..Rs.	3,45,169	0	0
charged outside the dam, I do not think it will cost less than Rs. 2-8-0 per 100 cubic feet, which will give	95,643	0	0
The masonry in foundation of sea wall, 18,408 cubic feet, would probably be executed for Rs. 12 per 100 cubic feet, the stone being had from the excavations ; but all this will depend on the arrangement made for having water and mortar at hand, say Rs. 12	2,209	0	0
The foundations of the dock walls, 41,884 cubic feet, will also cost Rs. 12 per 100 cubic feet, the stone being supplied from the excavation ; this gives	5,026	0	0
The amount of cubic feet of rubble masonry in lock and dock walls and counterforts is 913,088, which, at Rs. 15 per 100 cubic feet, the stone being supplied from the excavation, will give ..	1,36,963	0	0
The number of cubic feet in coping of sea wall from redoubt to lock is 7,869, which, at Rs. 1-6-0 per foot, will give	10,820	0	0
The description of stone facing for sea wall and walls of docks is not given, but supposing it to be of the description used on the Moody Bay work, viz. large khandkees, the charge of Rs. 70 per 100 superficial feet would be about it ; which, for 127,877 superficial feet, gives	89,514	0	0
In the general description of works it is stated that the lock walls are to be faced with ashlar work, but the size of the square stone is nowhere given : supposing it to be alternately a stone of 2 feet long and 1 foot high and 2 feet deep, and 2 feet long on the face, and 1 foot high and 1 foot deep, the charge would be about Rs. 180 per 100 superficial feet, of which there are 38,841, which would give	31,072	0	0
The charge for stone coping for the dock walls will			
Carried over..Rs.	7,16,416	0	0

Brought over.. Rs.	7,16,416	0	0
be the same as that for the sea wall ; Rs. 1-6-0 per cubic foot for 32,010 cubic feet gives, instead of Rs. 440-2-2	44,014	0	0
The charge for the stone coping of lock walls, 4,836 solid feet, at Rs. 1-6-0 per solid foot, instead of Rs. 56-7-11, as charged at Rs. 1-6-0 per 100 cubic feet	6,712	0	0
There is evidently some mistake about the hollow coins. The size of the stone is nowhere mentioned ; but supposing it to be 3 feet square, and 1½ feet high, this would give 64 such stones for the four heel-posts of the gates ; at Rs. 1-8-0 per cubic foot, the charge for each stone would be Rs. 20, and for the 64 stones, instead of Rs. 192..	1,280	0	0
The charge for the lock gates is entered in one item of Rs. 4 per cubic foot of the timber work when completed. This is much too small. I find that in my late estimate for renewing the dock gate at Mazagon, the expense would have averaged Rs. 8-12-0 per square foot, exclusive of the heavy iron work and copper sheeting. Looking to the larger space and height of these gates requiring larger timber, I do not think that Rs. 11 per square foot would be a bit too high, and this I find to be about the charge made by the Civil Engineer in June 1830. The proposed gates contain about 3,422 square feet, which, at Rs. 11 per foot, gives	37,642	0	0
The charge of 2 annas per lb. for the iron work provided is not sufficient ; the correct quantity is 11,782 lbs., and 3½ annas would be about the price per lb. (Rs. 6-2-0 per maund)	2,565	0	0
There are no data in this office to show what the cost of a double purchase crab is likely to be ; perhaps Mr. Gerrard obtained the price from the Dockyard or Gun Carriage Manufactory	960	0	0
Carried over.. Rs.	8,09,589	0	0

Brought over.. Rs.	8,09,589	0	0
The charge for the $\frac{7}{8}$ chain is about right; a fathom of it will weigh about a maund, and 96 fathoms, at Rs. 7 per fathom, will be	672	0	0
The charge for the tenders for docks appears about correct—Rs. 2 per cubic foot, including squaring and fitting with bolts; and 6,806 cubic feet of timber complete, at Rs. 2, gives.....	13,612	0	0
There is nothing in the plans to show how the large quantity of cast-iron is to be applied to the tenders. The weight deduced from the cubic inches is correct, and Rs. 120 per ton may cover the price, if sent from England; 117 tons, at Rs. 120.	14,040	0	0
The charge for wrought-iron work will be, as before, $3\frac{1}{2}$ annas for 61, and for 9 tons 16 cwt. and 3 qrs., or 22,036 lbs. [the equivalent in lbs. of 9 tons 15 cwt. 3 qrs. is 21,924, and not 21,841]	4,820	0	0
The size of the ring-bolts is not given, but, bearing other charges in view, they will probably cost Rs. 20 each, and not Rs. 12; this for 20 will give.	400	0	0
The charge for the breakwater is enough, Rs. 4 per 116 cubic feet of rubble stone; the two breakwaters are together 2,101,200 cubic feet, and cost	72,455	0	0
It is probable that a large quantity of this rubble may be obtained from the excavation, by which means there would be a small saving, viz. the difference between Rs. 4 and the expense of filling in, minus the expense of removing the excavated rock to the site of the breakwater. The charge for puddling the back of lock and dock walls is too small. It will at least cost Rs. 2 per 100 cubic feet, having to be brought from the boats outside the dam to the walls when required; 743,600 cubic feet of puddle, at Rs. 2, gives	14,872	0	0
The charge for broken stone, including rolling and watering, is Rs. 6-4-0 per 100 cubic feet, and not Rs. 2; for 327,490 cubic feet it will be	20,468	0	0
Carried over.. Rs.	9,50,928	0	0

Brought over. . Rs.	9,50,928	0	0
The charge for the mooring stones, if they are to be half buried in the ground, appears enough, Rs. 1 per cubic foot, for 400	400	0	0
The total amount of estimate will be, according to the foregoing computation, Rs. 9,51,328, to which, if 10 per cent. be added for contingencies, the amount will be 10,46,460, and this amount will, I think, be required, and there are many omissions in this estimate ..... Rs.	9,51,328	0	0
No provision is made for keeping the ground clear of water (1); no copper sheeting to the dock gates (2); the floor of the dock is represented with an invert arch of large stones, whereas facing is only charged for (3); some iron work is provided for sluices, but no sluices are provided for in the plan or estimate (4); neither are any struts provided for to brace up the dock gates, where a pressure of water may be on them (5); no sandstone is provided for the roadways (6); no provision appears to be made for rebuilding that part of the cremaillere work not comprised in the dock and locks, or to form a barrier between the reclaimed ground and the Mint premises (7); no provision is made for carrying off the water of the Mint ditch into the dock (8); or for providing a substitute for the large sewer which flows from the town under the Town Barrack necessary (9); or for carrying off the drainage of the town from the ends of the five iron pipes which cross the Mint ditch (10). The estimate is so *general*, the plan on so small a scale, with only two cross sections in 1,533 running feet, and no information whatever being given regarding the point from which measurements have been taken, that it is impossible to make a more minute comparison of the plans and estimates.	95,132	0	0
(Signed) J. J. F. Cruickshank.			
19th September 1855.			
Carried over. . Rs.	10,46,460	0	0

	Brought over..Rs.	10,46,460 0 0
(1)	Double the charge for the proposed new dock in the Dockyard ... .Rs.	3,720 0 0
(2)	Copper sheeting.....	16,747 0 0
(3)	Paving floor of lock (deducting charge for facing)	6,292 0 0
(4)	Sluices, number unknown, say	1,000 0 0
(5)	Struts for dock gates	409 0 0
(6)	Sandstone for raised ground	10,006 0 0
(7)	Rebuilding cremaillere work.....	36,636 0 0
(8)	Drain for emptying Mint ditch into dock ..	23,618 0 0
(9)	Carrying Town Barrack drain to basin	86,197 0 0
(10)	Town drainage from iron pipes to be carried to the Town Barrack drain	3,342 0 0
	A dam will be required to keep out the water from the north side of the works	37,077 0 0
	Ten per cent. contingencies are included in the above probable charges .....Rs.	12,71,504 0 0

(Signed) J. J. F. CRUICKSHANK.

20*th September* 1855.

(C).

MY DEAR WADDINGTON,—I have the pleasure to send the memorandum on Mr. Gerrard's estimate, with the probable amount for the missing items filled in. I do not think there is any probability of the proposed dam standing out for one monsoon.

Yours sincerely,
(Signed) J. J. F. CRUICKSHANK.

20*th September* 1855.

(D) *Memorandum.*

On a careful consideration of the advantages and disadvantages of the different sites proposed for the construction of wet and dry docks, with the requisite buildings, in Bombay, I am decidedly of opinion

that the one in the space comprised between the Arthur and Apollo Bunders is the best in every point of view; and I venture to suggest that the whole of the ground now recovering from the sea to the westward of the Colaba causeway be included, the causeway to be removed, and that the road to Colaba should go in a line from the Cooperage along the Back Bay. This would give a magnificent space of ground, on which, should the project be carried out, works commensurate with, and worthy of the growing importance of the port of Bombay, might be executed.

2. It will, in my opinion, be essentially necessary that the rocky patch running off from the Arthur Bunder, marked in pencil on the plan thus , be included; the sea wall, which I have sketched out roughly on the plan, to be carried round it from the Arthur Bunder in a curved form, which I think would be the best adapted for resisting the action of the swell in the SW. monsoon; the entrance to the docks should be at the northern end.

3. The enclosing the rocky patch above mentioned will remove the greater part of Commander Daniell's objections, as it will be seen on reference to the plan that there is ample room, and deep water, available for anchorage and laying down the requisite buoys for transporting ships to and from the docks. As for the swell setting in during the SW. monsoon on the shore rendering it dangerous for ships to approach, I beg to say that, if proper precautions and means are used, I see no difficulty in docking and undocking vessels; and I further beg to point out, that previous to the erection of the breakwater at the Government docks, the same difficulties existed as far as regarded the swell rolling in, but which did not hinder the taking in and out ships requiring to be docked.

4. The greatest rise of tide observed at the Government Docks, on very high-water springs, has been 18 feet, but I should take the mean average at 16 feet to 16 feet 6 inches in the locality I have proposed for the wet and dry docks.

(Signed) C. W. Montriou, Commander I. N.,
Master Attendant, &c. &c.

Master Attendant's Office, 5th October 1855.

(E) *Memorandum produced before the Committee on the 5th October* 1855.

Arthur Bunder Docks.

Estimate, Rs. 14,23,996.

Import dock, 1,740 feet by 200 feet; 17 first class ships.

Export dock, 2,760 feet long, 13 first class ships, and 20 more to anchor in the middle.

About 145,000 cubic yards of rock excavation, and that close to the Colaba ground.

Apollo Bunder Docks.

Estimate, Rs. 15,64,827.

Import dock, 7 acres 3 fur., 3,615 feet long, would dock 17 ships.

Export dock, 11 acres 3·20 fur., 5,150 feet long, ditto 24 ditto.

A great deal of rock excavation in import and import bay docks (about 250,000 cubic yards).

Moody Bay Docks.

Estimate, Rs. 12,71,504.

Import dock, 1,070 feet long, 10 first class ships.

Export dock, 1,340 ditto, 12 ditto; about 200,000 cubic yards of rock excavation.

The average depth of rock excavation is the greatest.

Boree Bunder Docks.

Estimate, Rs. 17,79,925.

Import dock, 4,020 feet long, 18 first class ships.

Export dock, 4,900 ditto, 22 ditto ditto.

Rock excavation about 346,000 cubic yards.

(F) *Boree Bunder.*

The latest survey by Commander Selby having proved that the approaches to a dock formed at Boree Bunder are too shallow for the entrance of large vessels without great expense in cutting a passage through rocks which were previously stated to have upon them four to five feet of mud, the constructing of docks upon that site is necessarily abandoned.

Moody Bay.

The space is quite insufficient for the trade of the port, unless that portion which is appropriated for the railway terminus be added to the site for the docks.

Apollo Bunder.

By extending a sea wall or quay from the pier, and forming the dock gates between the Apollo Pier and the rock shown in Selby's chart, and extending the sea wall or quay in a straight line to meet another quay extending from Arthur Bundur, docks sufficiently large for the present and prospective wants of the port could be constructed, with dry docks, and considerable space for quay and warehouse room; and if the railway can have a branch line formed with a neighbouring terminus, this site between the Apollo Pier and Arthur Bunder seems to have fewer difficulties than either of the foregoing sites at Boree Bunder or Moody Bay.

South of Arthur Bunder.

This site has no particular advantages either for construction or approach for shipping, and is too far from the Town and Fort to be recommended.

[Memo. by Mr. Heycock, given in to the Committee on the 5th October.]

Minute by the Right Honorable the GOVERNOR, *dated the 19th October* 1855.

The President and Members of the Wet Dock Committee should receive our thanks for the care and attention with which they have so far discharged the duty committed to them.

2. It is to be regretted that Mr. Heycock's plan has proved to be of more difficult execution than was anticipated. I should prefer the site between Boree Bunder and Carnac Bunder to any other, if a sufficient depth of water could be obtained without incurring an amount of expense out of proportion to the advantages to be gained.

3. Major General Waddington's suggestions as Chief Engineer

are judicious, and will receive the attention of Government when further steps are being taken with respect to the construction of the proposed works, in whatever locality they may be carried out.

4. We should of course communicate the information contained in the Dock Committee's report of proceedings and its accompaniments to any Company inclined to undertake the construction of the docks.

5. It appears almost premature to consider as yet the several details and conditions of the control and management of the wet docks at Bombay, questions regarding which would arise from the formation of a Dock Company, until some specific overtures shall be made for the construction of docks.

6. In our letter to the Court of Directors reporting our proceedings on this subject, which should be accompanied by copies of all plans, &c. submitted to us, it may be well to inform the Court that the probability which exists that the projected works will be undertaken by a Joint Stock Company has prevented our proposing that the dock works (though essential to the improvement of the port, and, indeed, urgently called for by its growing importance) should be constructed at the expense of Government.

19*th October* 1855. (Signed) ELPHINSTONE.

Minute by the Honorable J. G. LUMSDEN, *Esq., dated the* 23*rd October* 1855.

The proceedings of the Committee, including the appendix, and accompanied by copies of the plans, and, if practicable, by a reduced copy of Commander Selby's chart, ought to be printed, and rendered widely accessible to the public. Any feasible scheme for the construction of commercial docks, whether wet or dry, is likely, if carried into execution, to stimulate and promote the trade of this port, and should receive, I think, the support and sanction of Government if a Company could be found to undertake it.

2. It is to be understood that I deprecate, with Mr. Ritchie, any measure involving "the compulsory use of wet docks attended with heavy dock dues"; but if Government should have to deal with a Company which may be willing to embark its capital in the construction of docks on unobjectionable conditions, and upon any parti-

cular site, I should equally deprecate the arbitrary limit of its enterprise to a particular locality on any such plea as the greater or less expense of construction.

3. This is a subject for a commercial Company to take into its consideration, not for Government to deal with; since the loss as well as the proper investment of their money is the Company's concern, while any expenditure of funds on such projects is certain to some degree and in some way to benefit the place, and should not, I think, be prevented, or even discouraged, on the strength of the faith which Government may repose on its own belief that the speculation will be a losing one.

4. Certainly, to express my individual opinion, Commander Selby's chart, with Captain Montriou's memorandum, seem to establish that in respect of depth of water and of saving of expense in rock blasting, and also of warehouse and dock-room, docks between the Apollo and Arthur Bunders would be the most eligibly situated, and the cheapest. I nevertheless, upon the whole, consider the commercial advantages of the site selected by Mr. Heycock to be so superior to those of any of the other sites proposed, and I so entirely agree in the opinions expressed in the lucid memorandum (Appendix A) by Mr. Berkley, that had not Mr. Heycock (see Appendix E) given up the point, and admitted the superiority of the dock site between the Apollo and Arthur Bunders *to have been established by Captain Selby's chart*, I should have advised that, without prejudice to any scheme for constructing docks which might be hereafter proposed by others, we should inform Mr. Heycock that we would support his plan, by affording it every facility in our power, and by granting the site to a Company on his proving to us that the work would be prosecuted to a conclusion.

5. I must repeat, however, that I consider the inquiries embodied in this report and its appendix, by the Committee appointed by Government for the purpose of selecting the best site for wet docks, to be extremely valuable, and I do not think they should be lost sight of, as they will be if shelved in the Secretariat. They should be printed and published, so as to be available at all times and to all persons who may hereafter contemplate the construction of docks at this port as a profitable speculation.

(Signed) J. G. Lumsden.

23rd October 1855.

P. S.— I annex for record a valuable memorandum on this subject which I received some time since from Mr. Heycock, and which I think should not be lost.

(Signed) J. G. LUMSDEN.

Memorandum by E. HEYCOCK, *Esq., dated 2nd May* 1855.

For the establishment of a Dock Company in Bombay, two conditions are especially required from the Government,—1*st*, a grant of the land to construct the docks upon ; 2*nd*, an Act, in the usual form, empowering the Company to levy dock dues upon all the shipping and goods entering the harbour of Bombay. To satisfy these conditions, the docks should be placed contiguous to the Fort and Town of Bombay, in a well sheltered position, and readily approachable with safety from the sea; sufficiently capacious to receive the shipping ; and easily accessible by the railway. To these requisites, a large quay space and extensive ground-floor warehouse accommodation would be an inestimable benefit.

I submit that these conditions all meet in the site chosen for the docks at Boree Bunder :—1*st*, they are exactly between the Fort and Town; 2*nd*, the position is well sheltered; 3*rd*, the entrance to the docks would be in the direction of the ebb and flow of the tides, and is not obstructed with rocks; 4*th*, the docks would furnish more space than the trade at present requires; 5*th*, the railway runs close by the intended docks; 6*th*, by a removal of the soldiers' lines, and keeping the railway off the shore, as at present, extensive accommodation for ground-floor godowns or sheds, besides those along the quays surrounding the docks, can be erected, sufficient to store a very large portion of the goods brought to Bombay.

In order to obtain this space on shore, and to keep the railway from incommoding the traffic of the port by running the passenger trains too near to the docks, it is necessary that the intended site for the railway terminus in Moody Bay should be abandoned, and that the station should either be continued where it now is, or that it should pass through Fort George, and along the west side of Moody Bay, to a station to be formed near the back of the Mint (see accompanying plan). This would bring the station very nearly to the

centre of the Fort, and, by opening a good broad road between the Mint and the Castle, where there are no buildings to pull down, the traffic would at once pass into the Fort without inconvenience to the crowded parts. The sea front of Moody Bay would then be left open for the landing of coasting traffic, and for the new custom-house and warehouses.

It is not necessary that the custom-house should be close to the docks, but rather that it should be near to the offices of the merchants, and, at the same time, in the direction of the docks, so that a communication is easily kept up with the docks, and with the offices where nearly all the entries are filled up.

The ruinous state of Fort George, together with the additional fortifications which are contemplated in the harbour, will, it is to be hoped, allow of the removal of Fort George altogether, or at least allow of the railway being run through its enclosure. The railway terminus, if brought close to the Castle, would, by giving such increased facility to the transport of military stores to all parts of India, do more to give strength to the Government and security to the empire than Fort George could do if in the very best possible repair. In its present condition it can be no protection either to the Fort or shipping. It is, therefore, worthy the best consideration of Government whether an alteration in the line of railway, which is now so practicable, and of such evident benefit to the passenger traffic, and of the greatest necessity to the trade of the port, by allowing the whole shore from the south end of Moody Bay to be made available for quay purposes, should not at once be sanctioned before any expense be laid out upon the new terminus. The arrangements now to be carried out will have an enduring influence upon the commerce of Bombay ; for if shore space cannot be found to accommodate the trade of Western India at this place, when the railway is opened throughout the length and breadth of the land, some fresh port must be selected, where the facilities are greater and the restrictions less. To preserve the trade here, and make this place the depôt for exports and imports, it will be eventually necessary that the whole of the ground to the east of Dobhees' Row should be set apart for commercial purposes, say for the use of the railway and docks. Such an arrangement would not abridge the open space of the Esplanade, for no one thinks of passing the Dobhees' Row for the purpose of exercise or recreation.

As railways are determined upon for India, it seems to be a necessity that commensurate preparations should be made to accommodate the increase of external and internal traffic which must follow the throwing open the interior to the advantages of export and import commerce. Already the Fort of Bombay is too crowded, and the shore between it and the Town is the most accessible spot for the commerce by sea and land to meet upon; and if this space be wasted, by appropriating the shore to the use of the railway alone, the injury done to the place, to the railway, and to the shipping, will be irremediable.

The objections to Moody Bay as a site for docks are, that it is too confined to afford space to accommodate both docks and railway; and, if given up to the use of the docks only, there is not warehouse space to meet the increased trade which the opening of the railways must develope. It seems excellently adapted for a landing-quay for the coasting trade, and site for the new custom-house, and *passenger* station for the railway, otherwise it is not difficult of access, and is well sheltered.

Minute by the Honorable A. MALET, *Esq., dated 24th October* 1855.

I have long deemed the question of wet docks in Bombay as affecting in a high degree the present welfare of the port, and as prospectively of even far greater moment.

2. The three great lines of rail now under contemplation converging in Bombay from the North-West Provinces, Calcutta, and Madras, with their various branches to the most productive districts of the interior, the construction of good roads to numerous boat harbours on our coasts, and the probable effects on produce of the revenue survey in the Bombay Presidency, may reasonably be expected to increase our exports and imports to an immense extent.

3. In this hope it seems to me that the wet dock accommodation should be supplied with no stinted estimate, and that the great importance of the proximity of the docks to the railway terminus should receive the fullest consideration.

4. There are four plans for wet docks now before Government: 1*st*, Boree Bunder, which, on account of the difficulties attending it, has been abandoned by its proposer; 2*nd*, Moody Bay, the accom-

modation in which is considered too limited; 3*rd*, between Apollo and Arthur Bunders, which is approved by the Committee; 4*th*, outside Arthur Bunder, condemned by the Committee as having no particular advantages to counterbalance its distance from the commercial portions of the Town.

5. The first and fourth of these appear to me to have been properly rejected; on the third no remarks are required from me; but on the second the importance of the subject induces me to venture to make some suggestions.

6. The necessity for ample room in the docks, and for easy railway communication between them and the railway terminus, are points undisputed. The absence of the former has, I believe (for the other objections are insignificant in comparison), led to the rejection by the Committee of the Moody Bay plan. If, therefore, by a modification of the present plans for the railway terminus and the Moody Bay docks, space for the latter can be provided without prejudice to the former, it seems to me that the desired objects will be gained.

7. With this view I beg to propose for consideration the construction of the railway terminus in the space between Carnac and Boree Bunders, and the appropriation of Moody Bay for the wet docks, with the necessary buildings, for all of which it appears from Captain Selby's survey there will be room, as the site may, though with increased expense, be considerably widened to seaward, while, if the railway terminus be removed, it can be lengthened as far as Boree Bunder.

8. It seems to me that by this plan all the necessities for wet docks will be provided; the railway terminus will be in a better situation than at present contemplated; and for the public, ample access to the harbour between the two premises will be maintained.

9. In conclusion, I would suggest that if no Company is ready to undertake the construction of the wet docks, it might be worthy of consideration whether it would not be profitable for Government to construct and maintain them.

24*th October* 1855. (Signed) A. Malet.

Further Minute by the Right Honorable the GOVERNOR, *dated 29th October* 1855.

Until I read Mr. Ritchie's memorandum I had never heard that there was an idea of making the use of the proposed wet docks compulsory. It seems to me that such an idea would be simply ridiculous. If the dock dues should equal the expense incurred by the delay and risk of loading and unloading ships in the open harbour, it would obviously be useless to construct docks at all; but as the time of the large vessels employed in the trade of Bombay is as valuable as that of large vessels in all other ports, and as it would no doubt be very much economised by the facilities afforded by docks with warehouses in their immediate vicinity, there can be no reason why it should not be for the advantage of the shippers and ship-owners to make use of them; and if it is for their advantage, it is clearly superfluous to make it compulsory to resort to the docks. With regard to the site of the proposed docks, I cannot quite agree with my honorable colleague, Mr. Lumsden, that this should be left exclusively to the consideration of the commercial Company which may be willing to construct them. As the site must be granted by Government, surely it is but fair that Government should have a voice in the matter. The Committee was appointed by Government purposely to ascertain what would be the best site.

They have reported in favour of one which I certainly should not myself have preferred, had it been possible to find another site equally well adapted for the purpose. The reasons which would have led me to prefer either Mr. Heycock's or General Waddington's sites are no doubt sufficiently obvious to my honorable colleagues. Neither of these projects would have interfered with the Esplanade, which is almost (if not quite) the only open space left for recreation and exercise in this populous island, nor would they have involved the contingency of intersecting some of our principal thoroughfares by a railway, which must, I fear, necessarily cross them upon the same level. These reasons lead me to hope that the suggestion offered by my honorable colleague, Mr. Malet, may be found practicable and easy of adoption. I venture to recommend that it be referred to the Committee, and that they should be requested to give it their best consideration. I think that the objections to the prolongation of the railroad along the Esplanade, and across the principal

thoroughfares in Bombay, may also be communicated to the Committee.

I entirely agree with my honorable colleague, Mr. Lumsden, that the proceedings of the Committee, and the valuable papers and plans by which they are accompanied, should be printed and published; they would form an interesting number of the Selections from our Records. I understand that there is every probability of a Company being formed to construct the docks as soon as the question of their site and the other preliminaries have been settled.

October 29th, 1855. (Signed) ELPHINSTONE.

Further Minute by the Honorable J. G. LUMSDEN, *Esq., dated 5th November* 1855.

If Mr. Malet's plan be practicable, I think it a *very good* one, and shall willingly support a reference on the subject to the Committee.

On the other hand, if a commercial Company are to construct the docks and find the capital, I still think that it is not for Government to interfere in the selection of a site, unless upon military or political grounds, and I know of no material objections on such ground to any selected site. I think that we shall have no docks constructed by a commercial Company if we are to dictate to them on this essential point, and I believe that Government would consult the best interests of the public by supporting any feasible scheme which a commercial Company may propose *and engage to carry out*, be the site selected where it may. I also very much fear, from all I hear, that no commercial Company will engage to construct wet docks in the present state of matters, unless the use of them is made compulsory, to which I have a decided objection, or a dividend upon the capital expended be guaranteed by Government.

In the latter case Government would have an undoubted right to fix the site, though I should question the wisdom of their doing so in opposition to the opinions of the merchants or capitalists embarking in the undertaking.

5th November 1855. (Signed) J. G. LUMSDEN.

Further Minute by the Honorable A. MALET, *Esq., dated 6th November* 1855.

I concur in the reference to the Committee; at the same time I think the Commissioner of Customs might be requested to prepare a report, showing the expense of loading and unloading ships by boat at the different seasons, reduced to a rate on the ship's tonnage, and the length of time required; and any other information which will, in his opinion, be of use in calculating the returns which may be expected from the docks. If he could estimate the cost of management, &c. in the docks it would be of advantage.

6th November 1855. (Signed) A. MALET.

No. 1698 OF 1855.

PUBLIC WORKS DEPARTMENT.

To Major General WADDINGTON,
President of the Committee appointed to consider certain Projects and Plans for Wet and Dry Docks.

SIR,—Having laid before the Right Honorable the Governor in Council your letter No. 8, dated the 11th October last, with its accompaniments, consisting of copies of the proceedings of your Committee, with original papers, plans, and estimates, I am directed to communicate to you the following reply.

2. His Lordship in Council learns from the papers now submitted that your Committee have had four different localities under their consideration as sites for the proposed docks,—viz. 1*st*, the site proposed by Mr. Heycock between the Carnac and Boree Bunders; 2*nd*, the site at Moody Bay; 3*rd*, that between the Apollo and Arthur Bunders; and 4*th*, the site between the latter bunder and Bummalow Island.

3. The first site, on account of the many difficulties it involves, has been abandoned by its proposer; the second is not considered "sufficiently large for a general scheme of dock accommodation"; the third has been approved by the Committee; and the fourth, being disadvantageously situated in respect to the commercial town, has been condemned by the Committee.

4. As regards the first and fourth proposals, no remarks are deemed necessary by Government.

5. With respect to the second site, as the absence of sufficient space for efficient dock accommodation has led to the rejection of Moody Bay by the Committee, it has occurred to Government that it may be practicable, by a modification of the present plans as respects the railway terminus, to provide sufficient accommodation for the docks in the locality referred to.

6. With this view, I am desired to propose, for the consideration of the Committee, the expediency of removing the railway terminus to the space between the Carnac and Boree Bunders, and the appropriation of the whole of Moody Bay for the wet docks, with the necessary buildings, for all of which Government observe there will be ample room, as the site might not only be lengthened as far as Boree Bunder, but also, though with increased expense, be considerably widened to seaward if necessary.

7. Government are desirous of being informed of the opinion of the Committee on the plan above proposed, which appears to Government to offer many advantages. The railway terminus will be in a better position than at present contemplated, while ample access to the harbour would be permitted to the public between it and the proposed docks.

8. Regarding the third site, viz. that between the Apollo and Arthur Bunders, which has been approved by the Committee, I am desired to notice, as an objection to that locality, that should it be necessary to connect the docks by a tram or railroad with the railway terminus, and the commercial town, not only would some of the principal thoroughfares in Bombay be intersected, but the Esplanade, which is now almost the only space left for recreation and exercise in this populous island, would be seriously interfered with.

9. As soon as the question of the site of the proposed docks is determined, Government have resolved to have the proceedings of the Committee, and the valuable papers and plans by which they are accompanied, printed and published, so as to be available at all times and to all persons who may hereafter contemplate the construction of docks at this port as a profitable speculation.

10. In conclusion, I am desired to inform you that His Lordship in Council considers your suggestions as Chief Engineer to be judicious, and that they will receive the attention of Government when

further steps are being taken with respect to the construction of the proposed works, in whatever locality they may be carried out.

I have the honour to be, &c.

(Signed) H. YOUNG,
Offg. Chief Secretary to Government.

Bombay Castle, 13th November 1855.

No. 10 OF 1855.

From Major General C. WADDINGTON, C.B.,
President of the Committee appointed to consider certain Projects and Plans for Wet and Dry Docks,

To H. YOUNG, Esq.,
Offg. Chief Secretary to Government.

SIR,—In acknowledging the receipt of your letter No. 1698, of this date, referring to the Dock Committee certain proposals regarding the removal of the railway terminus to the space between the Carnac and Boree Bunders, and the appropriation of the whole of the Moody Bay for the wet docks and necessary buildings, I beg to bring to the notice of His Lordship in Council that an important member of the Committee in the consideration of any removal of the railway terminus, Mr. Berkley, has proceeded to England on furlough.

2. I request the favour of being informed whether Government propose to appoint a member in lieu of Mr. Berkley, or await his return, or whether I should assemble the Committee without him. The Committee, I may add, will be very incomplete without a representative of the Railway Company.

I have the honour to be, &c.

(Signed) C. WADDINGTON, Major General,
President of the Committee for Wet and Dry Docks.

Bombay, 13th November 1855.

No. 1734 of 1855.

Public Works Department.

To the Secretary to the
Great Indian Peninsula Railway Company.

Sir,—As Mr. J. J. Berkley, who was nominated by Government on the 21st March 1855 as a member of the Committee appointed to consider the project for wet and dry docks, has proceeded to England, I am desired to intimate that it is the intention of the Right Honorable the Governor in Council to request Mr. Ker to take Mr. Berkley's place in the Committee, if the Directors of the Great Indian Peninsula Railway Company have no objection to the arrangement.

I have the honour to be, &c.

(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 17th November 1855.

No. 1756 of 1856.

To Major General C. Waddington, C.B.,
President of the Committee appointed to consider
the Project for Wet and Dry Docks.

Sir,—With reference to your letter No. 10, dated the 13th instant, I am desired to inform you that the Right Honorable the Governor in Council has been pleased to appoint Mr. C. B. Ker to act as a member of the Dock Committee, in the place of Mr. Berkley.

I have the honour to be, &c.

(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 22nd November 1855.

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No. 11 of 1855.

From Major General C. Waddington, C.B.,
President of the Committee appointed to consider
the Project for Wet and Dry Docks,

To W. Hart, Esq., Secretary to Government.

Sir,—In compliance with the instructions conveyed in your letter No. 1698, of the 13th November, the Dock Committee again assembled on the 26th idem, including Mr. Ker, the new member appointed by Government in place of Mr. Berkley. Mr. Heycock, I regret to say, was absent from indisposition, but as the members of the Committee are of opinion that there is no necessity for another meeting, and that their resolution of the 26th September should stand, with the exception of one word—"unanimous"—which has been struck out of the last clause accordingly, I think it proper to submit their proceedings, signed by six of the members. The proceedings are accompanied by a letter from Mr. Ker, Chief Engineer Railway Company, and copies of two notes of dissent, one by Mr. Heycock and the other by Mr. Ker.

I have the honour to be, &c.

(Signed) C. Waddington, Major Genl., Chief Engineer,

Bombay, 3rd December 1855. President Dock Committee.

Proceedings of the Committee appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

Bombay, 26th November 1855.

Present,—

Major General Waddington, C.B.
Commander C. W. Montriou, I. N.
R. Strong, Esq.
R. Spooner, Esq.
C. B. Ker, Esq.
J. Parsons, Esq.
J. Graham, Esq.

Absent,—

E. Heycock, Esq.

Letter from Officiating Chief Secretary Young, No. 1698, of the

13th November, was laid before the Committee, and the feasibility of the scheme proposed by Government in the 6th paragraph of that letter discussed. The proposal of Government is to remove the railway terminus to the space between the Carnac and Boree Bunders, to appropriate the whole of Moody Bay for the wet docks, with the necessary buildings.

The objections to this scheme arise from the removal of the railway terminus, which would involve the following inconveniences :—

1*st*.—That the proposed site between the Carnac and Boree Bunders is 650 yards more to the north than that formerly assigned as a terminus on the ground reclaimed from Moody Bay, and, consequently, so much further removed from the Fort and from Colaba, though nearer to the Native Town.

2*nd*.—That ground reclaimed from the sea between the Carnac and Boree Bunders would be difficult of access to the railway, from its lying entirely on one side of the rail ; communication with it could only therefore be effected by turn-tables or back-points.

3*rd*.—That the now proposed terminus would not be in immediate contact with the wet docks, even if occupying the whole extent of Moody Bay.

In the 8th paragraph of Mr. Secretary Young's letter it is stated, as an objection on the part of Government to the site preferred and recommended by the Committee,—

> " That should it be necessary to connect the docks by a tram or railroad with the railway terminus and the commercial town, not only would some of the principal thoroughfares in Bombay be intersected, but the Esplanade, which is now almost the only space left for recreation and exercise in this populous island, would be seriously interfered with."

In reply to this objection, Mr. Ker has explained to the Committee, that if certain precautions and restrictions were observed, the railway crossing the Esplanade might be left unfenced, so as in no degree to interfere with the free and convenient passage of the public. The precautions would be to lay the rails as nearly as possible even with the surface of the ground, to pave or macadamise the space between the rails, and to restrict the speed of locomotives to a moderate or even to a slow rate.

Under the preceding considerations, the Committee find it difficult

to give an opinion in favour of the project put before them in Mr. Young's letter. They are disposed again to recommend as most advantageous the adoption of the space between the Apollo and Arthur Bunders as a site for wet docks.

But they are further of opinion that, if the Moody Bay site be still preferred by Government, the arrangement formerly proposed by the Committee, of assigning the northern portion of the reclaimed ground as a railway terminus, and reserving the southern portion only for the wet docks, is really sufficient for all the immediate wants of the port of Bombay. The opinion of the Committee is that export docks are comparatively little wanted, and may, without inconvenience, be dispensed with, while for import docks and their necessary buildings the reserved space offers sufficient accommodation.

(Signed) C. WADDINGTON, Major Genl., President.
C. W. MONTRIOU, I. N.
R. STRONG.
R. SPOONER.
J. GRAHAM.

From the CHIEF ENGINEER, Railway Company,
To the COMMITTEE appointed to consider the question of the most eligible Site for Wet and Dry Docks in the Harbour of Bombay.

GENTLEMEN,—As Chief Engineer of the Railway Company, I have well considered the subject of railway goods station accommodation in connection with that for a general scheme for wet and dry docks, and having consulted with other officers of the Railway Company well qualified to give an opinion on such matters, I find that they agree with me in considering that, on the opening of the two main lines of railway into the Deccan by the Thull and Bhore Ghauts, which will probably take place before the construction of the docks, at least thirty acres will be necessary for the proper accommodation of the goods traffic at the Bombay terminus.

I also find, on referring to an old document now in my possession, that the late Mr. John Chapman estimated the extent of ground that would probably be required for goods at seventy-five acres; and from my experience of railways in England, very few of which carry even a

moiety of our estimated tonnage, I have no doubt but that in the course of a few years, when the resources of the Deccan have been in some measure developed, his estimate will not be found to be far wrong.

As the question of the position of the railway goods station, inseparable as it must be from that of wet docks, has been brought under the notice of your Committee, I trust that you will not fail to consider, before passing any resolution in favour of the Moody Bay site, how, in the event of Government assigning the space for wet docks as shown on the sketch, the railway passenger terminus (now only ten and a half acres) is to be conveniently and economically enlarged for goods when found necessary.

On receiving the permission of your Committee, I will, on a future day, offer a few suggestions on the subject of railway station accommodation in connection with that of docks.

I have the honour to be, &c.

(Signed) C. B. KER.

Bombay, Railway Office, November 29th, 1855.

In accordance with Major General Waddington's expressed wish that I should state whether I concur in the resolutions adopted by the Committee on the 26th November, I have to state that I entirely dissent from the opinion expressed that " export docks are comparatively little wanted."

29th November 1855. (Signed) E. HEYCOCK.

I beg to record my dissent from any resolution of the Committee recommending, directly or indirectly, any site for docks " not sufficiently large for a general scheme for dock accommodation." (See 2nd clause of final resolutions 5th October.)

(Signed) C. B. KER.

(True copies)

(Signed) C. WADDINGTON, Major General,

Chief Engineer, President Dock Committee.

27th November 1855.

No. 1699 of 1855.

Public Works Department.

To the Officiating Commissioner of Customs.

Sir,—In connection with the question of the construction of wet and dry docks, which is under the consideration of a Committee of which you are a member, I am directed by the Right Honorable the Governor in Council to request that you will prepare and submit to Government a report showing the expense of loading and unloading ships by boat at the different seasons, reduced to a rate on the ship's tonnage, and the length of time required, and any other information which will in your opinion be of use in calculating the returns which may be expected from the docks. If you can estimate the cost of management, &c. in the docks, it would be of great advantage.

I have the honour to be, &c.

(Signed) H. Young,

Secretary to Government.

Bombay Castle, 13th November 1855.

No. 1850 of 1855.

Public Works Department.

From R. Spooner, Esq.,

Offig. Commissioner of Customs, Salt, and Opium,

To W. Hart, Esq.,

Secretary to Government.

Bombay, Office of Comr. of Customs, Salt, & Opium, 13th Dec. 1855.

Sir,—I have the honour to acknowledge the receipt of your letter No. 1699, dated the 13th ultimo.

Cost of loading and unloading vessels in the port of Bombay.

2. In reply, I beg to state that I am unable to furnish the information required by Government, or, at least, am unable to give such full and perfect information as I should have wished to have done.

3. This department does not interfere in matters solely having reference to the cost of loading and unloading vessels, and, consequently, there is nothing procurable from the current or old records

of this office to guide me in procuring or extracting the information required.

4. On making inquiries from the several merchants, I still experienced great difficulty in procuring the required information, as there is no uniform system or practice adopted by them. One firm, perhaps, contracts for boat-hire alone; another contracts for the goods being discharged from the ship, and landed on the wharf; while another, perhaps, contracts for the removal of the goods from a ship to the depositing of them in the merchants' warehouses, including the cost of guarding them, &c. &c.

5. The points, however, on which I am required to give information are as follow :—

1*st*.—The expense of loading and unloading by boat at the different seasons of the year.

2*nd*.—The length of time required; and

3*rd*.—Any other information which may be of use in calculating the returns which may be expected from the docks.

6. In reply to the first question, I would beg to state that the single item of boat-hire is 4 to 4½ annas per ton during the fair season, and 6½ to 7 annas during the south-west monsoon; but there is a further expense in delivering to, and receiving from the boats.

7. I am informed by T. C. Cowie, Esq. (who has, I may here add, afforded me the greatest assistance in prosecuting my inquiries), that a contractor would undertake to bring goods all the year round from a dock, situated about where the custom-house now is, to his office, for 6½ annas per ton less than from a ship in the harbour to the custom-house, and thence to his office.

8. With reference to the second question, I would beg to state that the length of time required to unload a ship, say of 500 tons register, is about twenty to twenty-five days.

9. One-third or one-half of the time now occupied in unloading a ship in harbour would often be saved were she to deliver her cargo in dock to a dock company. Much of the delay now experienced arises from the system of each consignee sending for his own cargo.

10. Another advantage arising from the docks would be the impossibility of, or at least the great difficulties which would be thrown in the way of petty pilferage while the goods are being conveyed from the ship to the wharf. Again, the goods would be free from the

damage which now takes place, from wet, while in transit from the ship to the shore during the monsoon.

11. Adverting to the third question, I would beg to state that it is impossible at the present time to form any opinion as to what returns could be reasonably expected from the docks. A great deal must of necessity depend on the cost of docks, the rate of dock dues, and also whether the using of the docks, and payment of the dues, is optional or the contrary.

12. Mr. Cowie, who is no mean authority on such matters, states that the extreme estimate of benefits likely to be derived from docks is Rs. 1,11,530 per annum, and that to that extent only it would be fair to levy a tax on ships and cargo for using the said docks.

Imports.. Rs.	79,843
Exports..	31,687
Rs.	1,11,530

13. Whether Mr. Cowie's calculations are correct cannot at the present time be ascertained, or, indeed, until the whole work is completed, and all matters connected therewith fixed and settled. I beg, however, to submit extract from his communication to me (dated the 8th instant), as it contains much that is very interesting, and may eventually prove to be very useful.

I have the honour to be, &c.

(Signed) R. Spooner,

Offg. Commr. of Customs, Salt, and Opium.

Extract Paragraphs 9 *to* 21 *from a Demi-official Letter from* T. C. Cowie, *Esq., dated* 8*th December* 1855.

9. Having enumerated the advantages to be derived from the use of docks, it is necessary to point out that it is only a portion of the trade of the port to which these advantages attach.

10. It will be observed that the estimate of the saving of boat-hire is based upon the supposition that whether the ship be in harbour or in dock, the same extent of land carriage is necessary of the goods to be shipped or imported. But this applies to only a small part of the tonnage of the imports and exports of Bombay. Whenever goods can be stored or prepared for shipment in places having a water frontage, it is an advantage to make use of such places, as lighterage is found to be far cheaper than any land conveyance. The

most convenient ports in the world are those intersected by canals; and although our harbour does not possess their advantages, it approaches during the fair season very near to them in the convenience and cheapness of transport which it affords. Many of our imports and exports consequently are landed at, and shipped from, such places (having water frontage), without being carried to the custom-house; and in such cases for the most part the water conveyance from and to the ship would be availed of were she unloaded or loaded in dock, just as it now is while she lies in the harbour.

11. Among imports a large item is that of coals, the delivery of which in dock, if not prohibited as a positive nuisance, would be attended with inconvenience and extra expense, while grain, iron, and some other goods would probably derive no advantage from the docks.

12. Of the exports, I conceive that nearly, if not quite, the whole of the cotton and other produce; as hemp, wool, &c. shipped in pressed bales, would, on the average, be conveyed as cheaply from presses to a ship in harbour as to one in dock, and three-fourths of our export trade has until recently been in cotton and wool.

13. It would take some trouble to particularise the part of our trade which benefits by the use of the docks, but a few figures will show how large a proportion would not derive advantage from them; and I give the following totals of the ship tonnage entered inwards and cleared outwards in the year ending 31st July 1855, with deductions for such portions of the trade as I conceive would derive no advantage. From the import tonnage I deduct, of course, ships in ballast, and also ships which come from Australia, Aden, and Kurrachee, with coals and country produce sufficient for ballast merely, also the tonnage required to bring the coals and iron imported. From the export tonnage I take ships in ballast, and that required for salt; also what is taken for the conveyance of the pressed bales of cotton, wool, hemp, munjeet, &c. as follows:—

14. *Inwards.*

Square-rigged ships, about..... Tons 160,000

Deduct—

Ships in ballast (tons 40,466) and ships from Australia, Aden, and Kurrachee, with coals and country produce for ballast only, about..... 61,000

Carried over..... Tons 99,000

Brought over		Tons 99,000
Import of coals.....	Tons 20,500	
Of which from Australia.....	1,400	
	Tons 19,100	
Which would occupy tonnage about.....	15,000	
Imports of iron.....	Tons 7,000	
Which would occupy about.....	5,600	
		20,600
		Tons 78,400

15. *Outwards.*

Square-rigged ships, about		Tons 170,000
Deduct,—ships cleared in ballast		13,500
		Tons 156,500
The exports of salt were 542,000 maunds (20,290 tons), which would occupy tonnage of about 16,000, and of cotton, wool, hemp, munjeet, &c. 480,000 bales, which would occupy 96,000		112,000
		Tons 44,500

16. There are many other articles of *import* besides those I have enumerated which would not benefit by the docks; and it is to be observed regarding the *exports*, that a large portion of such goods as would be with advantage shipped in dock composes a small part of the cargoes of ships otherwise cotton laden, and would, even were there docks, be sent to those ships whether they lay in dock or in harbour.

17. I consider, therefore, that the above figures might be further reduced, and that the proportion of inward tonnage benefited would be much less than half, and of outward tonnage than a fourth, of the whole.

18. Suppose, however, we take as much as 70,000 tons of import, and 40,000 tons of export tonnage, as likely to derive benefit from the use of the docks, and calculate the pecuniary saving which would be effected on those quantities, and the goods they would import and export: I suppose that of the imports one-half would be susceptible of the advantage of exemption from risk of damage and pilferage,

equivalent, on the average, to the saving in boat-hire. On the exports, probably, this would be an over-estimate, owing to the small value of seeds, one of the principal items.

19. Of the *import tonnage*, 70,000 tons of shipping would bring of cargo say ..... Tons 90,000

On which the saving would be boat-hire, &c. landing, 6½ annas per ton ..... Rs. 36,562
Exemption from pilferage and damage in monsoon on 45,000 tons, at 6½ annas..... 18,281
Saving of time to 100 ships of 700 tons each, at Rs. 100 per diem, for 2½ days on the average.... 25,000

Rs. 79,843

Saving on import cargoes, and ships, equal to Rs. 1-2-3 per ton of the ship's registered tonnage.

20. *Export tonnage,—*
40,000 tons would take of cargo..... Tons 52,000

On which the saving would be boat-hire, &c. shipping, at 6½ annas per ton ..... Rs. 21,125
Exemption from risk of pilferage, &c., 26,000 tons, at 6½ annas 10,562

Saving on export cargoes ..... Rs. 31,687

Equal to 12 annas 5 pies per ton of the ship's registered tonnage.

21. The aggregate of these sums, viz. on import tonnage and cargoes.....Rs. 79,843
Export cargoes 31,687

Together..Rs. 1,11,530

I conceive to be an extreme estimate of the savings which would be effected, and, consequently, the utmost which it would be fair to levy as a tax on ships and cargoes for the use of the docks and their wharves for import and export.

(True extract)
(Signed) R. Spooner,
Offg. Commissioner of Customs, Salt, and Opium.

Minute by the Honorable J. G. LUMSDEN, *Esq., dated the 20th December* 1855.

I am disposed to concur with the Committee in still preferring the site between the Apollo and Arthur Bunders for wet docks.

Any scheme for dock accommodation at this port should be complete. I am quite of Mr. Heycock's opinion, that export as well as import docks are much required.

From Mr. Ker's letter and minute, and the 2nd paragraph of the Committee's proceedings of the 26th November, now submitted, it seems to me evident that there is a want of sufficient space at Moody Bay even for the proper accommodation of the goods traffic at the railway terminus when, in the course of not many years, the rail extensions have been carried into the heart of the country.

And finally, I look upon the great expense of excavating at Moody Bay, which will be found essential, should docks on a large scale be there constructed, as a strong argument (independent, too, of the greater area for warehouses and accommodation between the Apollo and Arther Bunders) in favour of the latter locality.

The objection to a rail or tramway across the Esplanade has been in some degree met by Mr. Ker's explanation to the Committee.

Taking the various difficulties in respect to the selection of *a good site* into consideration, I think that, without overlooking the importance of the objection just referred to, there are fewer to be encountered in the construction of docks in the site preferred by the Committee than are inseparable from any other scheme; while there is one most important advantage in working between the Apollo and Arthur Bunders, that is possessed by no other site, and for which no other advantages which other sites may possess can in my opinion compensate,—I mean a natural basin of deep water, and a natural reef or ramp of rock outside of it, admirably suited for forming the base, and supporting the foundations of quays and piers to seaward.

I fear, however, we are losing time in these discussions, at least until there shall be found a Company proposed to undertake the work.

(Signed) J. G. LUMSDEN.

P. S.—Since I wrote this I have seen Mr. Spooner's letter of the 15th of December, with the accompanying extract from a letter by Mr. Cowie.

These papers do not alter or affect my opinions on the general question, though what Mr. Cowie says specially of lighterage and water frontage of the goods which would not benefit by being shipped or unshipped at docks, is certainly in my view unfavourable to the project.

(Signed) J. G. LUMSDEN.

Minute by the Honorable A. MALET, *Esq., dated the 27th December* 1855.

I regret that I am unable to acquiesce in the Committee's opinion, that the site proposed for the Apollo docks is preferable to that for the Moody Bay docks.

The main objection to Moody Bay was want of room, otherwise the site was apparently considered by the Committee as preferable to any other: the respective areas at Apollo Pier and Moody Bay may, it seems, for rough measurement, be taken at about fifty and forty-five acres, taking in at Moody Bay all that is possible, up to the projecting portion of Fort George.

If the latter site be preferable to the former, excepting only on account of want of space, it hardly seems to me that so small a difference should weigh down the balance against it.

With reference to the provision for the railway terminus, it is evident from Mr. Ker's letter that he was not aware of the proposal to give up so much space for it: a rough measurement would give about fifty acres as available for recovery from Carnac Bunder to the limit of that to be given to the docks, leaving a road between them for public access to the sea; and the objection of the Committee as to the site being on one side of the line of rail would easily be met by a slight encroachment on Carnac Bunder merely. An easy curve would bring the rail into a convenient position; while, if an extension of the line to Colaba be at any time necessary, it will be considerably shorter than from Moody Bay; it would cross the Esplanade in the same line as now contemplated by the Committee, while it would only have to accommodate the Colaba trade; whereas if the Apollo docks be constructed, nearly the whole import and export trades of the port will be forced upon it.

I concur in the Honorable Mr. Lumsden's opinion that both export and import docks are required; and though I would not, under

the anticipation which may be fairly urged of the increase in the trade of this port, confine my expectations of dock returns to anything like Mr. Cowie's calculations, they deserve great weight in showing how necessary it will be not to incur any avoidable expense, and to give to docks the greatest advantages of contiguity to the railway terminus.

(Signed) A. MALET.

Minute by the Right Honorable the GOVERNOR, *dated the 2nd January* 1856.

I regret that I am unable to concur with the Wet Dock Committee in preferring the site between the Apollo and Arthur Bunders to that which was suggested by my honorable colleague Mr. Malet. The former report of the Committee stated that "the site at Moody Bay is not sufficiently large for a general scheme of dock accommodation, although it might suffice for import docks only. From the estimates before the Committee it appears that the cost of construction at Moody Bay would be much more considerable, in proportion to the accommodation afforded, than at any other site. The site is in all other respects most eligible."

In order to meet the only objections which are here stated to exist against the Moody Bay site, it was proposed by my honorable colleague that the whole space which is to be taken in at this spot should be given up to the docks. The Committee have not favoured us with any information as to the extent of additional accommodation which would thus be afforded, nor as to the effect which this alteration would have upon the proportionate cost of constructing docks on this site. They have confined themselves to three objections, all of which are connected with the second part of my honorable colleague's suggestion, viz. the site of the railway terminus, which he proposed should be on the spot originally selected as a site for docks by Mr. Heycock, viz. the space between Carnac and Boree Bunders.

The first objection is that the railway terminus will be 650 yards more to the north than that formerly assigned for it on the space to be reclaimed from Moody Bay,—consequently, so much further removed from the Fort and from Colaba, although so much nearer to the Native Town.

I confess myself quite unable to discover the force of this objection.

The site of the terminus on the Colaba or south side of the Fort, which is preferred by the Committee, is further from the Fort than the Moody Bay site; but this was not considered a sufficient reason for preferring the insufficient accommodation which that site, when divided between the docks and the railway terminus, would have afforded; neither was it deemed any argument against the Apollo and Colaba Bunder site that it was at least half a mile to the south of the Native Town. In comparing the two sites, it would have been fairer to have contrasted the difference in distance between the Fort and the site approved by the Committee with that between the Fort and the site suggested by Government, than between the latter and the rejected site at Moody Bay, which is certainly more immediately contiguous to the Fort than either of the others.

The second objection, that the proposed site for the railway terminus between the Carnac and Boree Bunders would be difficult of access from the railway from its lying entirely on one side of the present line, and that communication with it could only be effected by turn-tables or back-points, is not, apparently, suggested or concurred in by the Railway Engineer, and can hardly, I think, have been sufficiently considered by the Committee. It appears to me, as I perceive it has occurred to my honorable colleague Mr. Malet, that the communication might be effected by a branch rail of no great length, and of a very easy curve.

The third objection, that the now proposed terminus would not be in immediate contact with the wet docks, even if *occupying* the whole extent of Moody Bay, would be a valid one if it were insurmountable. I regret that I have not got the plans with me to refer to; but I was under the impression that the space to be reclaimed at Moody Bay extended to the north as far as Boree Bunder, while the proposed site of the railway terminus commenced at this point. If I am mistaken, I should like to be informed whether there would be any difficulty in connecting the space to be reclaimed at Moody Bay with Boree Bunder. If there is no apprehended difficulty in doing this, this objection falls to the ground.

There is one more point to be noticed. When we are considering the objections to Mr. Malet's plan, Mr. Ker has stated that as soon as the Bhore Ghaut and Thull Ghaut lines are fully opened to goods traffic, at least thirty acres will be required for the accommodation of this traffic at the Bombay terminus, and that the late Mr. Chapman

estimated the extent of ground that would probably be required at no less than seventy-five acres: but in this respect the space between Carnac and Boree Bunders has, it appears to me, an advantage over every other site; for in the first place my honorable colleague states that at a rough estimate it contains about fifty acres; and in the next, it is capable of extension on both sides—either by giving up the space now occupied by the sepoy lines, or by taking in more ground from the harbour; but I apprehend that fifty acres would be sufficient to accommodate the goods traffic, without any necessity for taking in more ground. I cannot express too strongly the objections which I entertain to an unfenced railway running along the whole length of the Esplanade, and crossing, on a level, the principal thoroughfares in the island: when I think of the crowds that congregate every evening upon the Esplanade, and of the immense traffic upon the two principal roads which it must intersect, I cannot but anticipate inconvenience and danger from a railway such as the Committee recommend. If it is determined to adopt their recommendation as to the site of the wet docks, I trust that some plan may be devised for carrying the railway to the south of the Fort without these most objectionable features.

(Signed) ELPHINSTONE.

Further Minute by the Honorable J. G. LUMSDEN, *Esq., dated* 13*th January* 1856.

The Right Honorable the Governor observes that "it was not deemed any argument against the Apollo and Colaba site that it was at least half a mile to the south of the Native Town."

It is probably, as he has stated in a pencil note, considerably more than half a mile.

But the Committee, I imagine, did not consider the distance to *the south* an objection, since there could be stations at the Fort gate and the Native Town; and it is obvious that the further a line of rail extends through the length of a long narrow island like this of Bombay and Colaba, the more is the public convenience consulted.

Moreover, the chief staple which it is expected will be brought to the coast by the rail is cotton: of this the greater part must be taken to Colaba, and pressed and shipped from thence wherever the terminus may be.

I am informed that it was the Railway Engineer, Mr. Ker himself, who suggested the second objection to the Committee: any branch rail of no great length, and of an indispensably easy curve, such as that suggested by the Honorable Mr. Malet, leading into the land proposed to be recovered to the south of Carnac Bunder, *must cut through* that bunder; and, if Government will agree to the enormous expense* of purchasing this property, which will thus be destroyed, of course it can be done.

As to the third objection, I concur in the remarks of the Right Honorable President: a line of rail might be laid down to communicate with the docks on construction in the site proposed at Moody Bay; and wherever the docks may be placed, there will probably, in time, be such a rail.

The remarks of our Right Honorable President to the effect that, as regards extension, the space between Carnac and Boree Bunders has an advantage over every other site, appears to me to be open to the following objections:—

1*st.*—If you take more ground from the harbour in that neighbourhood, you destroy the main access to Carnac Bunder.

2*nd.*—The ground required for a railway terminus should be an oblong; as I am informed breadth, without length of area, is of little use here. A terminus so placed would be at once the most difficult, expensive, and dangerous to work.

I fully participate in our President's objections to an unfenced rail level with the Esplanade, and carried across it. But I am unable to perceive such strong objections to a level railing, protected by a light, and, if you please, an ornamental fence, the main lines of road forming the level crossings.

I have, in conclusion, no more to add than to repeat my conviction, that whether the railway terminus be at Moody Bay, as originally determined on,—and it seems there would be no more ground recovered in that quarter than will be found necessary hereafter for such a terminus,—or whether the terminus be placed at Colaba, where any quantity of ground can be recovered, both lengthways and breadthways, towards Back Bay, without great expense or difficulty, the Committee have shown that there is no site so fit for export and import docks

* For a portion only of the *Clare* Bunder, with warehouses, compensation of Rs. 1,71,390 was paid.

together as that preferred by them between the Apollo and Arthur Bunders.

(Signed) J. G. LUMSDEN.

Further Minute by the Honorable A. MALET, *Esq., dated the 14th January* 1856.

I have no wish to make any further remarks.

(Signed) A. MALET.

Further Minute by the Right Honorable the GOVERNOR, *concurred in by the Honorable Messrs.* LUMSDEN *and* MALET, *dated 19th January* 1856.

In order that the Board may thoroughly understand the proposal before us, I recommend that a plan of the whole locality be prepared, showing the site of the railway terminus and docks suggested by my honorable colleague, Mr. Malet, and that of the terminus and docks at the Apollo Bunder. This will show at a glance the merits and demerits of each plan. The soundings in the neighbourhood of each site of the docks should be entered in the plan from Captain Selby's chart.

(Signed) ELPHINSTONE.
„ J. G. LUMSDEN.
„ A. MALET.

No. 278 OF 1856.

PUBLIC WORKS DEPARTMENT.

To Major General WADDINGTON, Chief Engineer,
President of the Dock Committee.

SIR,—In considering the correspondence which closes with your letter No. 11, dated 3rd December 1855, the Members of Government have experienced considerable difficulty in forming an opinion as to the comparative eligibility of two of the sites suggested for export and import docks,—whether it would be more advantageous that the docks should be constructed between the Apollo and Arthur Bunders, with a tram or railroad, either across the Esplanade or through the Fort, to connect them with the railway terminus, which in this case

would be constructed at Moody Bay, as hitherto intended, or that the whole of Moody Bay should be given up for the docks, as much land as may be necessary for the railway terminus being reclaimed from the harbour between Moody Bay and Carnac Bunder, or partly provided by an alteration of the sepoy lines; the railway terminus and docks being, in this case, contiguous to each other, and also connected by rail.

2. To enable the Governor in Council to decide on this point, he requires more detailed and comprehensive information than is now before him. He will, therefore, be obliged by your having a plan prepared, which will embrace the space between the north side of Carnac Bunder and the south side of Arthur Bunder, exhibiting the present line of railway, and the mode in which the ground contiguous to it is occupied; with the whole of the thoroughfares in the Fort and on the Esplanade which might possibly be affected by either scheme. The plan should also show the quantity of land which might be reclaimed for railway purposes, and the space which could be made available for docks at either site, with the best mode of appropriating it so as to provide for both export and import docks. The best line of communication between the docks and railway terminus, in either case, should also be shown.

3. I am further directed to request that you will let the soundings of the harbour at the entrance, and in the approaches of each dock site, be entered on the plan from Lieutenant Selby's survey.

I have the honour to be, &c.

(Signed) W. HART,
Secretary to Government.

Bombay, Castle 13th February 1856.

No. 2 OF 1856.

PUBLIC WORKS DEPARTMENT.

From Major General C. WADDINGTON, C.B., Engineers,
President of the Dock Committee,

To W. HART, Esq.,
Secretary to Government.

SIR,—In compliance with the instructions contained in your letter No. 278, of the 18th February, 2nd paragraph, I have prepared

a plan in duplicate of the ground from the north of the Carnac Bunder to the south of the Arthur Bunder, showing the present line and terminus of the railway, the thoroughfares of the Fort and Esplanade, and the soundings taken by Captain Selby in that part of the harbour which adjoins the shore within the abovementioned limits.

2. On one of the plans are delineated in red ink—1*st*, the outlines of the ground to the south of Carnac Bunder, which I would propose to make over to the Railway Company, with a view to its recovery from the sea, and appropriation as a suitable and convenient terminus,—the space so to be gained, with the railway forming its western boundary included, would be more than forty acres ; 2*nd*, import and export wet docks at Moody Bay, with custom-house and bonded warehouses. Each of these docks is calculated to receive from seventeen to forty-six vessels of large size, according to the number of tiers (from one to three) ranged along each wharf. The access to these docks is protected by a breakwater running from the south bastion of the Castle, and advantage is taken of this shelter to provide an ordnance wharf on the harbour front of the Castle ; 3*rd*, a continuation of the railway through the Fort to Arthur Bunder at Colaba. A width of 30 feet for a double line of rails is allowed throughout the Fort, and 40 feet elsewhere. The new flight of steps at Boree Bunder, and the arched way for boats leading to the bunder, are not interfered with in this plan. A redoubt at the north-east angle of the export dock, and an open battery under the east bastion of the Castle, are provided for the protection of the docks and terminus. A slaughter-house and necessaries, with the requisite approaches, are to be built in lieu of those which must be removed at Carnac Bunder, and for the accommodation of the present frequenters of Moody Bay. They are carried out in the plan into deep water.

3. The second plan exhibits the mode in which wet docks, with custom-house, and bonded warehouses, might be disposed between the Apollo and Arthur Bunders. I have described in this plan an extensive breakwater from the Gun Carriage Manufactory to the Dolphin Rock. Adjoining the latter a heavy battery might be advantageously placed for the defence of the harbour. For the protection of the docks a redoubt is provided near the entrance. These breakwaters will, I believe, be found necessary to secure still water for the ships before entering the lock. I have not thought it necessary to designate the " railway terminus " in this scheme further than by

writing those words on the ground to be recovered at Moody Bay. The line of railway to Colaba is nearly the same as in the first plan.

4. With reference to the relative advantage of either of these two projects, I believe that by the location of the docks at Moody Bay less expense would be incurred, and that the access for ships would also be more convenient. The site of Moody Bay is also more central for the commerce of the place, and, therefore, better adapted for the custom-house and bonded warehouses, than the neighbourhood of Colaba. The latter site, however, has the advantage of offering more space for the stowage of bulky goods.

5. I do not profess to enter here into particulars of design, and construction of these proposed docks. I shall state, generally, that the lock of entrance is made 270 feet long, and 56 feet wide, which would admit the largest ship that has yet entered this port, and I propose that the sole of the docks should be 10 feet below low-water mark of spring tides, which depth would also float such a ship with her cargo at high-water. The number of merchant ships at this time in the harbour is, I am informed, sixty-one. For the admission of steamers no provision is made. To admit them, greater width and length must be given to the entrance lock, but the depth of the docks would be ample.

I have the honour to be, &c.

(Signed) C. WADDINGTON, Major Genl. Engineers,
President of the Dock Committee.

Bombay, Office of Chief Engineer of Public Works,
30th April 1856.

No. 1273 OF 1856.

PUBLIC WORKS DEPARTMENT.

To the PRESIDENT OF THE DOCK COMMITTEE.

SIR,—I am directed by the Right Honorable the Governor in Council to acknowledge the receipt of your letter No. 2, dated 30th April 1856, and of the two comprehensive and valuable plans which have accompanied it.

2. His Lordship in Council has decided that of the two proposed dock sites, regarding the superior eligibility of which some doubt existed, that which your plan shows to be available at Moody Bay

is preferable, and he directs that it be kept available for the construction of a custom-house, warehouses, and docks, to be constructed on the general plan submitted by you, which, however, he wishes to be amended in two particulars, which will be noticed below.

3. The site proposed by you in the same plan for the railway terminus is approved of by Government; but the Governor in Council considers that the spot left unfilled in the plan between the proposed terminus and the export dock should also be filled in; the terminus being extended towards the docks so far as to leave only a commodious road between them from the "new road" to the sea wall, where a quay for small craft should be formed, instead of the Boree Bunder and its arched approach, the use and existence of which would thus be done away with altogether.

4. In carrying out these alterations would be involved the amendment to which allusion is made above at the close of my second paragraph, namely,—

1st.—To alter the direction of the sea wall of the export dock as well as that of the railway terminus, by bringing both to coincide with a straight line drawn from the angle in the wall of the export dock, as planned by you, to a point on the road leading to the proposed new slaughter-house, about half way between it and the southern angle of the Carnac Bunder; and—

2nd.—To place the proposed redoubt as much further out as may be required.

5. The Right Honorable the Governor in Council intends to at once apply for the Honorable Court's approval of the above scheme, and for their permission to undertake the formation of the docks as a Government work, unless some company should be found willing to do so.

6. With this view, it will be necessary to obtain at least an approximate estimate of the cost of the whole undertaking; and I am directed to request that you will favour Government with your opinion as to how this may best be obtained.

7. I am further to request that you will be so good as to return to my office the plan of the Moody Bay docks and terminus (which accompanies this letter) altered as suggested in my 4th paragraph.

I have the honour to be, &c.

(Signed) W. Hart,
Secretary to Government.

Bombay Castle, 23rd May 1856.

No. 3 of 1856.

Public Works Department.

From Major General C. Waddington, C.B.,
President of the Dock Committee,
To W. Hart, Esq.,
Secretary to Government.

Sir,—In compliance with the call made in the last paragraph of your letter No. 1273, of the 23rd May, I beg to submit a plan of railway terminus and docks laid out according to the instructions given in your letter. In consequence of the change in the direction of the outer face of the railway terminus and export docks, I found it expedient to shift the position of the redoubt to the salient angle of the outer faces, both of which it commands. By this arrangement the battery which in the former plan stood in front of the eastern bastion of the Castle may be dispensed with, and, as it is important to lighten expenses as much as possible, I have struck it out. In preference to altering the plan returned with your letter, a fresh drawing has been prepared.

2. In reply to the query addressed to me in the 6th paragraph of your letter, I have the honour to recommend that the Dockyard Engineer, Captain Wemyss, be called on to prepare the required plans and estimates. I think, with the assistance to be derived from Captain Selby's soundings and from the designs already prepared by Mr. Gerrard, there will be no serious difficulty in preparing an estimate sufficiently approximating to the probable cost of the works to enable Government to judge whether, in recommending the scheme to the Honorable Court of Directors, the expectation of a profitable return on the expenditure can be entertained.

I have the honour to be, &c.
(Signed) C. Waddington, Major General,
President of the Dock Committee.

Bombay, Office of the Chief Engineer of Public Works,
11*th June* 1856.

Resolution of Government, dated 19th June 1856, on the foregoing Letter from the President of the Dock Committee.

The plan now submitted by Major General Waddington should be lithographed, to be included in the printed compilation of correspondence regarding the docks, as the plan of docks and terminus approved of by Government; but the proposed extension of the railway through the Fort should be omitted from the lithographed copy, as the question of such extension is one for future deliberation, and does not affect the determination of Government as regards the proper position for the docks.

2. Government approve of the suggestion contained in paragraph 2 of Major General Waddington's letter, and the Chief Engineer of Public Works should be requested to instruct the Dockyard Engineer accordingly.

*** The above resolution was communicated to the President of the Dock Committee, and the Chief Engineer of Public Works, under date 21st June 1856, No. 1559.

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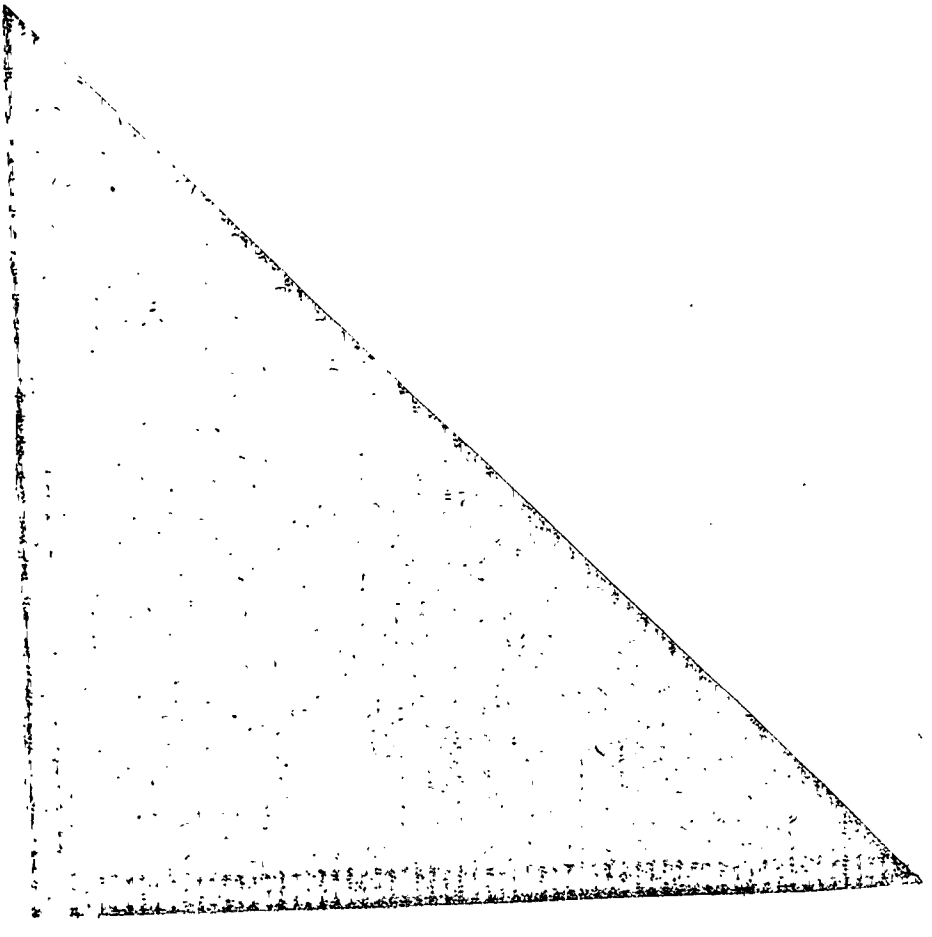

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